



California's Zero Net Energy Policies and Initiatives

NASEO Getting to Zero Conf.

Cathleen Fogel, Ph.D.

Demand Side Programs, Energy Division

California Public Utilities Commission

September 18, 2013

Presentation



- Why ZNE?
- What's been done to date?
- Challenges?
- Future Plans?
- Recommendations for other states



Big Bold Goals- Adopted 2007-08 by Energy, Utilities Commissions



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



State Buildings ZNE goals- Adopted by Executive Order in 2012



- All new state buildings and major renovations starting design in 2025 shall be ZNE
- 50% of new state facilities beginning design after 2020 shall be ZNE



- State agencies shall strive towards ZNE for 50% of existing state-owned building area by 2025.

Why ZNE Buildings?



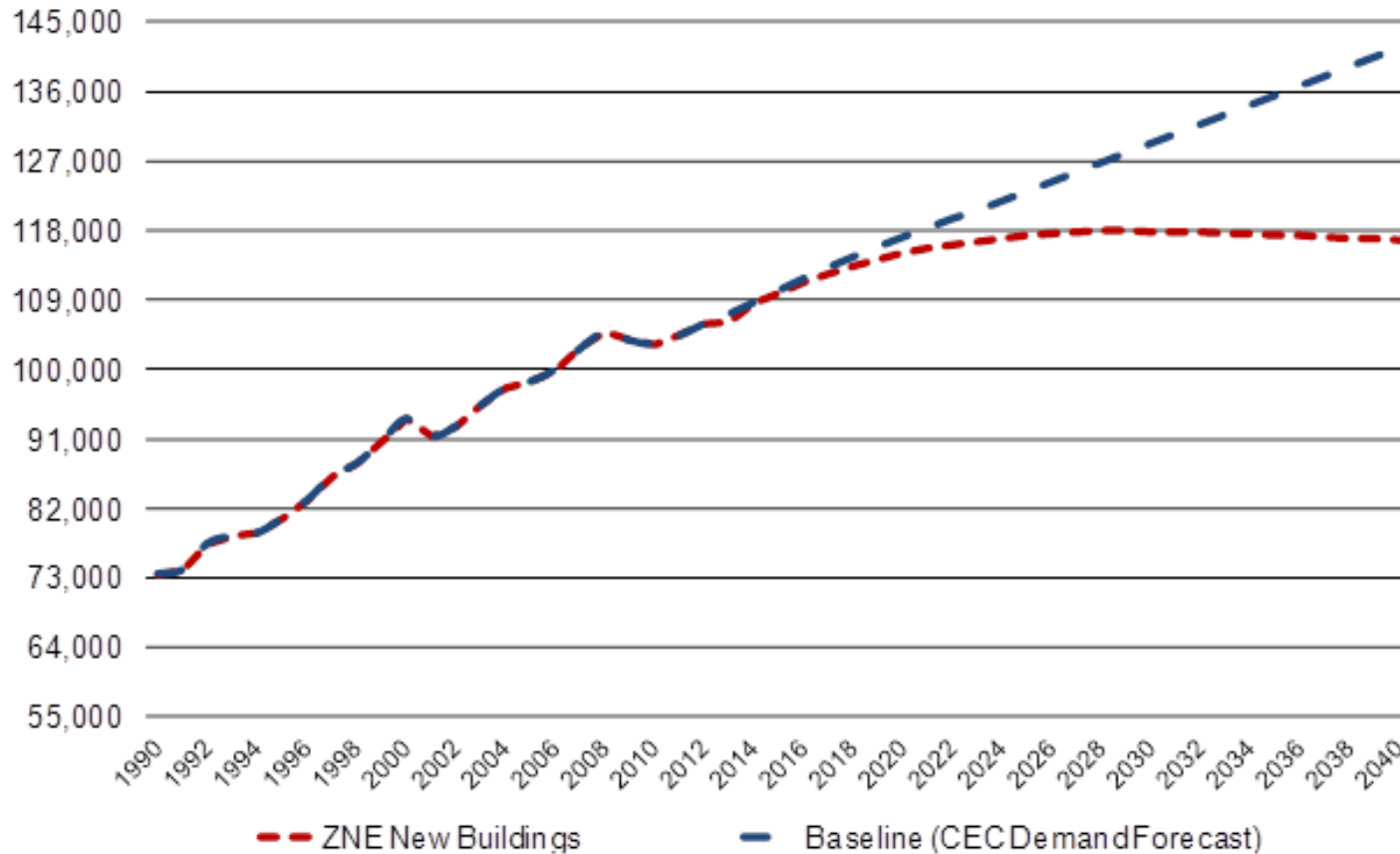
- Maximum long term energy savings
- Transform the market
- Incorporate gains into building code
- Ensure buildings are smart and efficient
- Re-engineer EE programs
- Achieve CA's GHG reduction goals



Energy Savings Potential Commercial ZNE Bldgs



Commercial Electricity Consumption with Efficiency Scenarios
(GWH)



State Buildings ZNE Goals Rationale



- Lead by example
- Enhance indoor / outdoor air quality
- Improve health and productivity
- Reduce costs and environmental impacts
- Invest green technology companies and jobs
- GHG reductions



What's Been Done ?

Dept of General Services: Selected 14 Pilot Projects



- 8 New Buildings
- 2 Major Renovations
- 4 Existing Buildings



CA Department of Public
Health, Richmond Labs, CA

- Leadership Network for State and Local Bldg officials

What's Been Done?

CA Energy Commission



- Goal of ZNE Building Standards by 2020/30
- CA Building Code (Title 24 2013)
 - Code compliance and building energy rating tools
- Title 20 appliance standards
- ZNE community, MF demo projects
- Cost effectiveness of PV for homes

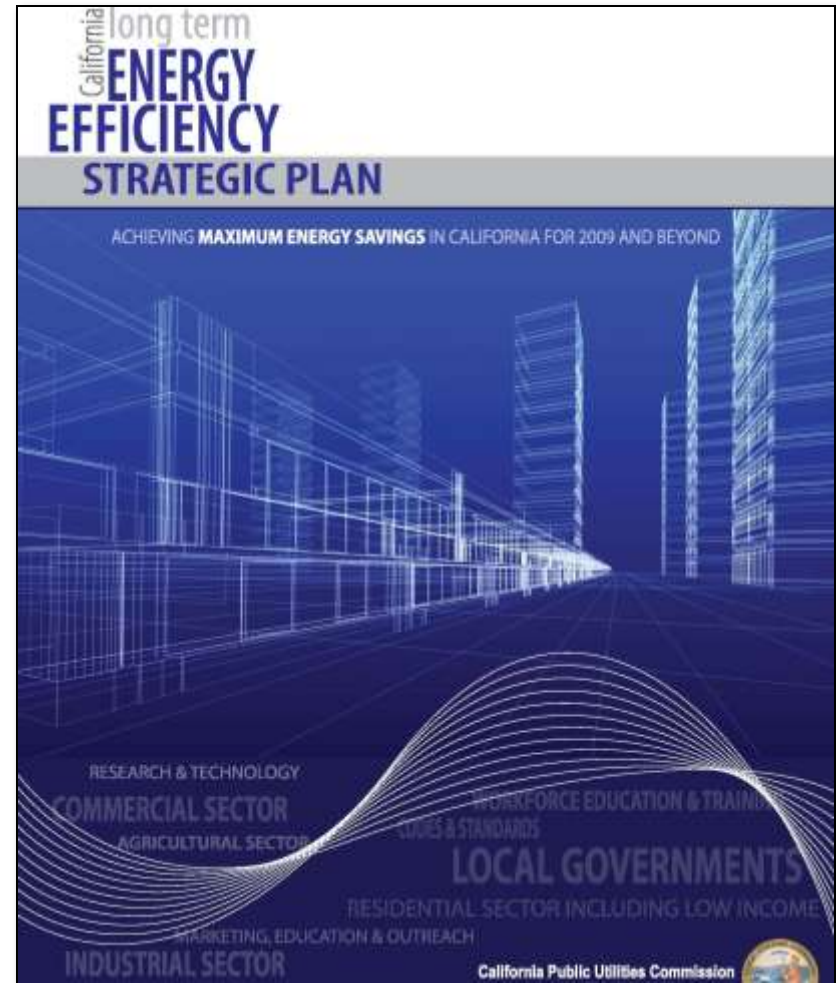
What's Been Done ?

CA Public Utilities Commission



- Building Codes
- Emerging Tech
- Performance-based New Construction

- “Reach” or “Path to Zero” Building Code Support for Local Govts



What's Been Done ?

CA Public Utilities Commission



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

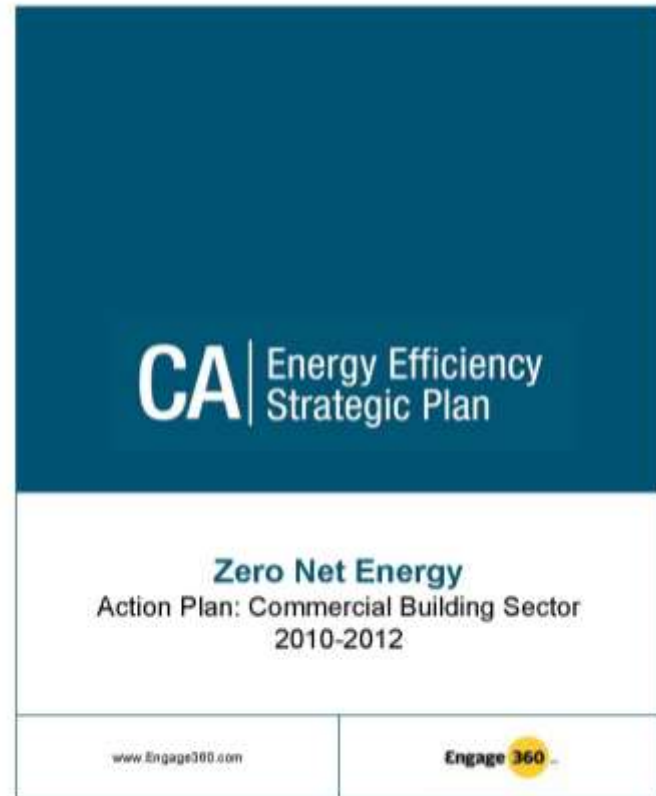
- ZNE and Sustainable Communities Pilot Projects
 - Demonstration Bldgs
 - Design guidance
 - Technical advice
 - Design competitions
 - Financial incentives
 - Technology trials
 - Contractor training

What's Been Done ?

CA Public Utilities Commission



- Stakeholder engagement
- Case studies and information sharing
- ZNE Messaging Toolkit (NBI)



Results?



- 40 ZNE commercial buildings since 2007*



DPR Construction San Diego Corporate Office ,
Chip Fox



Bacon St. Offices,
SDG&E & Hanna
Gabriel Wells
Architects



SMUD East Campus Operations Center, Doug Norwood

Results?



- Wide variety of building types and climate zones
 - Office & education
 - Multifamily
 - Military & public



David and Lucille Packard Foundation, Los Altos, CA



Chartwell School | Seaside, CA

Results?



- CA commercial ZNE buildings show little / no incremental cost*
 - Res ZNE buildings \$2 - \$8 /ft² inc cost, EE only



Exploratorium | San Francisco, CA



IDeAsZ² Office Building San Jose, CA

Challenges



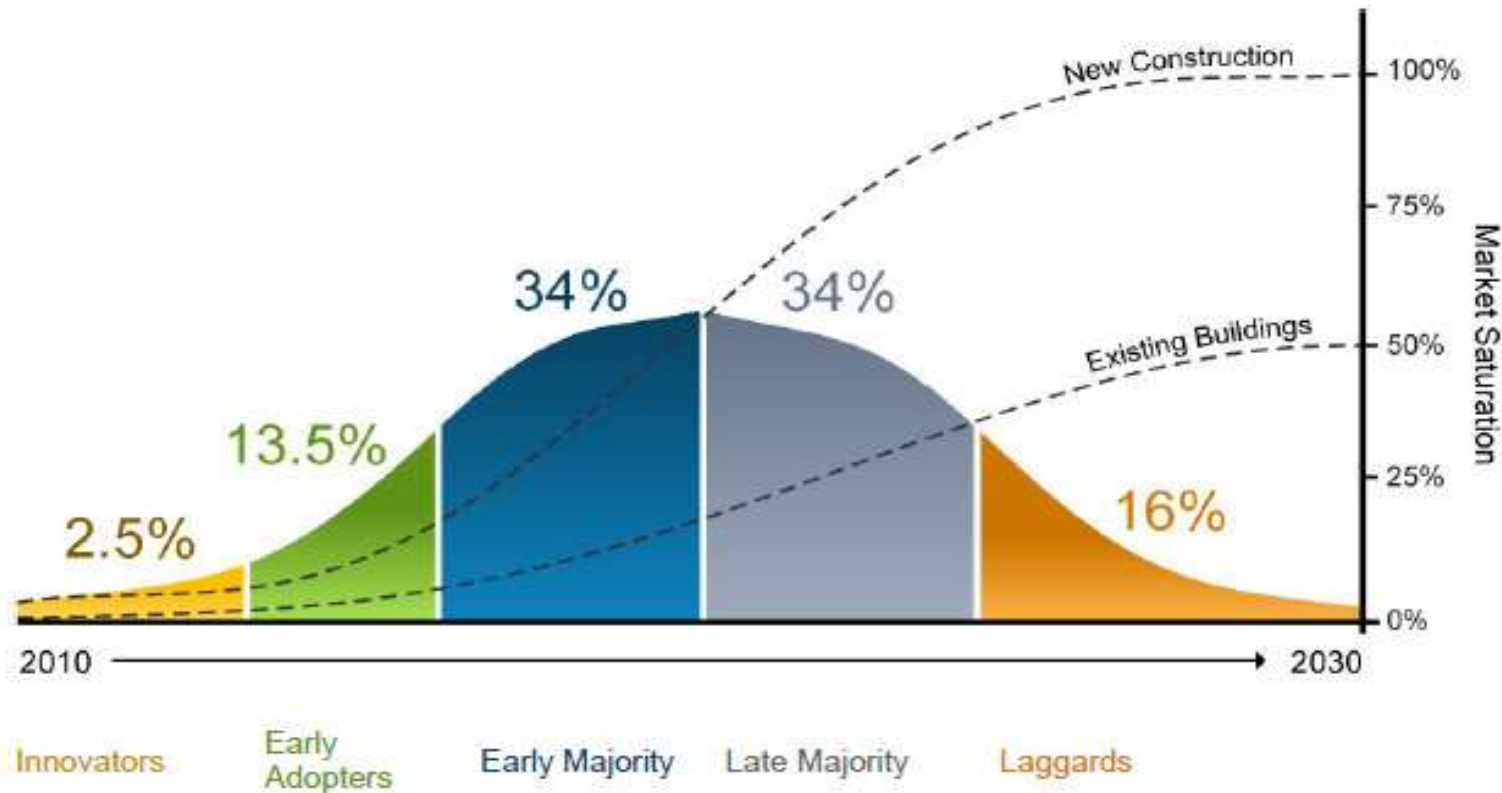
- Defining ZNE buildings
 - Zero annual cost, carbon or energy?
 - Which energy metric?
 - Onsite renewables or offsite as well?
 - Setting boundary for “onsite”
 - Efficiency requirements?

- Renewables grid integration at scale
- Sustaining focus
- Reducing first costs, creating demand
 - Single homes → subdivisions

Challenges



- Systems change / market transformation



Going Forward



- ZNE Codes and Standards \leftrightarrow programs
 - More aggressive pilot / tech testing programs
- Commercial Bldg Early Adopter program
 - Integrated building design training
- Residential
 - Energy Use Intensity (EUI)- based incentives
- Longer term cost effectiveness assessment (?)



Bacon Street Offices designed and owned by architects Hanna Gabriel Wells | San Diego, CA

Recommendations

- Set aspirational goals
- Define zero net energy
- Align building code, programs
- Provide technical, financial, design assistance
- Raise market awareness and demand



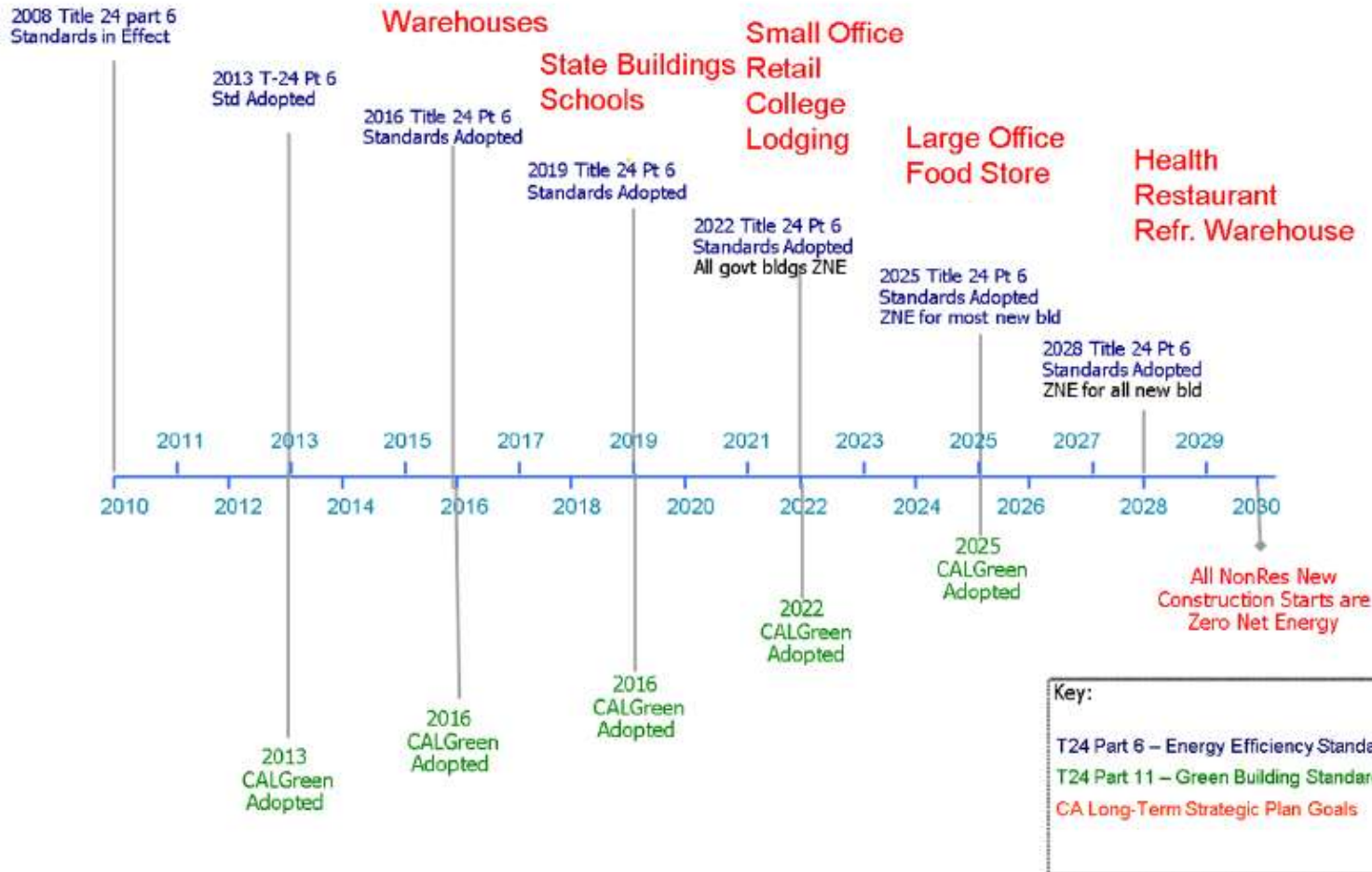
Leslie Shao-ming Sun Field Station | Stanford, CA



Jane D'Aza Convent, San Rafael

Start with the Easiest Buildings

Warehouses, Schools, Small Office



Thank you!



Cathleen Fogel
Demand Side Programs, Energy Division
California Public Utilities Commission

cf1@cpuc.ca.gov

415-703-1809

For more information:

[http://www.cpuc.ca.gov/PUC/
energy/Energy+Efficiency/eesp/](http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/eesp/)

<http://www.californiaznehomes.com/>

[http://newbuildings.org/
zne-communications-toolkit](http://newbuildings.org/zne-communications-toolkit)



Sacramento Municipal Utilities District



SMUD Energy Smart Community Project, with Pacific Housing and Sunverge Energy – zero peak, net zero, net zero carbon



SMUD SolarSmart Program, Elliot Homes Subdivision, Mike Keese and Alex Araiza,

Los Vecinos Affordable Housing, Chula Vista



ABC Greenhome (SoCalEdison)

www.abcgreenhome.com



KB Home Zero House 2.0



Irvine Smart Grid Demo Tract home ZNE retrofit project



Proposed Energy, Utilities Commission staff definition



“A Zero Net Energy (ZNE) Code Building is one where the societal value of the amount of energy provided by on-site renewable energy sources is equal to the value of the energy consumed by the building annually 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 Energy Use Intensity (EUIs) by building type and climate zone that reflect best practices for highly efficient buildings.”

Extra slides: Energy Commission Title 20 Priorities



Topic	Phase 1: Short Term (2 nd Qtr 2012 – 2 nd Qtr 2013)	Phase 2: Mid Term (2 nd Qtr 2013 – 2 nd Qtr 2014)	Phase 3: Long Term (2 nd Qtr 2014 – 2 nd Qtr 2015)
Consumer Electronics	Displays; Game consoles; Computers; Set-top boxes	Servers; Imaging equipment	Low power modes; Power factor
Lighting	Dimming ballasts; Multi-faceted reflector (MR) lamps; Light-emitting diode (LED) lamps	EISA exempt lamps; Lighting accessories; Outdoor lighting	Linear fluorescent fixtures;
Water and Other	Commercial clothes dryers; Toilets and urinals; Air filter labeling; Faucets; Amend pools and spas standards Water meters	Plug-in luminous signs; Irrigation equipment	Commercial dishwashers; Recirculation pumps; Refrigeration condensing units

Energy Savings Potential Residential ZNE Bldgs

