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
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Presentation

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

IBEW Zero Net Energy Center, San Leandro

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

DPR Construction San Diego Corporate Office , Chip Fox, DG&E

One Sky Homes Cottle House in San Jose, Allen Gilliand

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

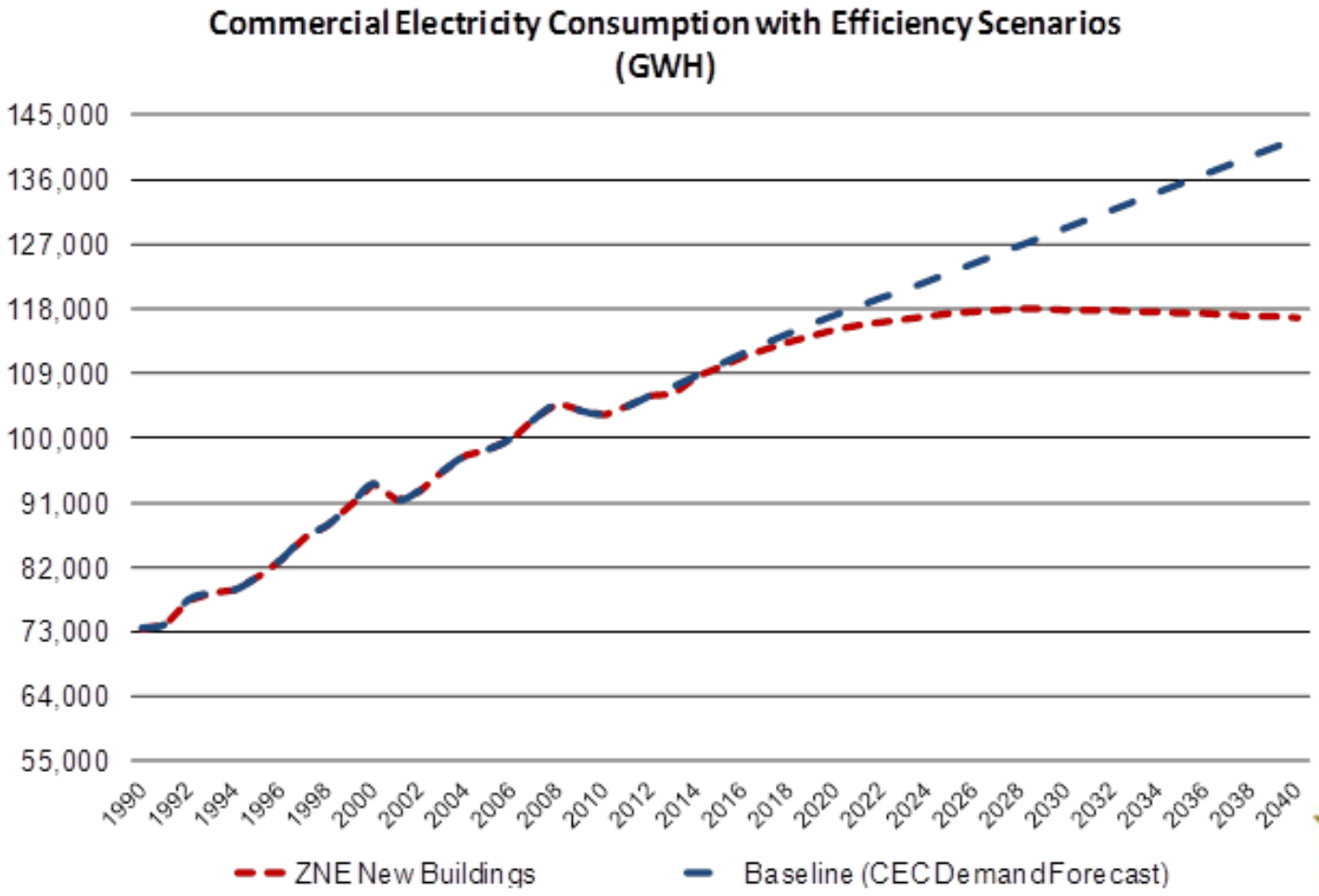
- State agencies shall strive towards ZNE for 50% of existing state-owned building area by 2025.

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

2010 Groundbreaking of IBEW Zero Net Energy Center, San Leandro

Energy Savings Potential Commercial ZNE Bldgs



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

California Conservation Core Camarillo Center, one of first 12 State Building ZNE Pilot Projects, Thomas Piette & Dan Burgoyne, DGS

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

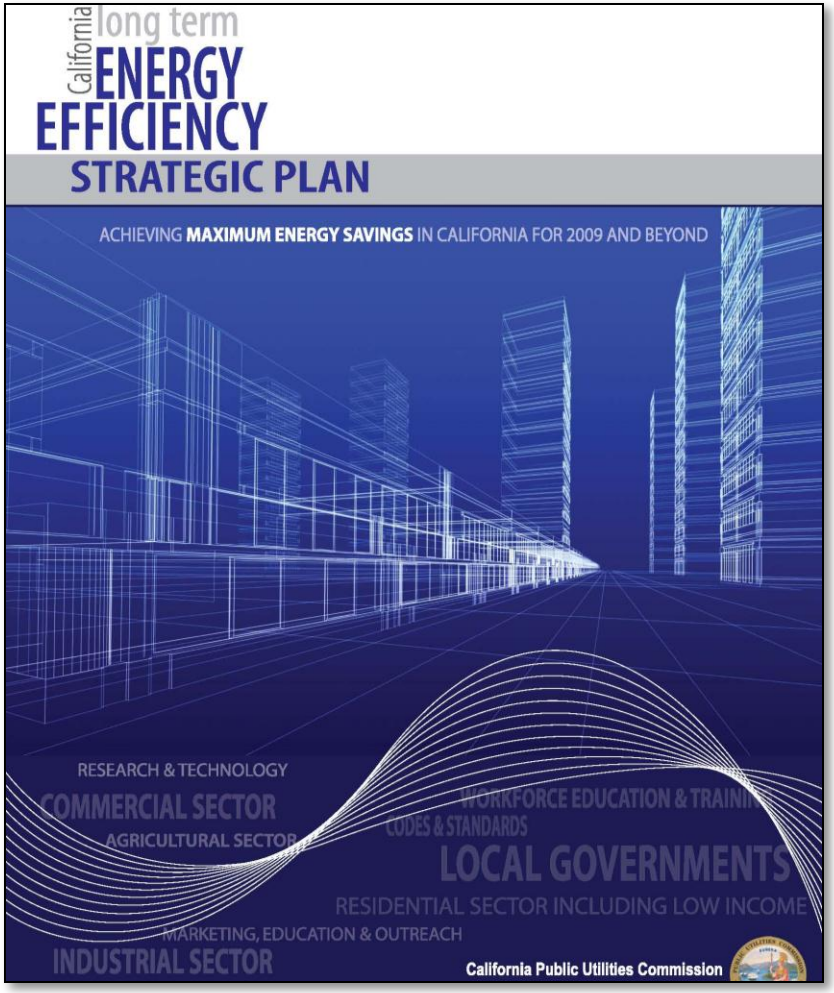
What's Been Done?
CA Energy Commission

- 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

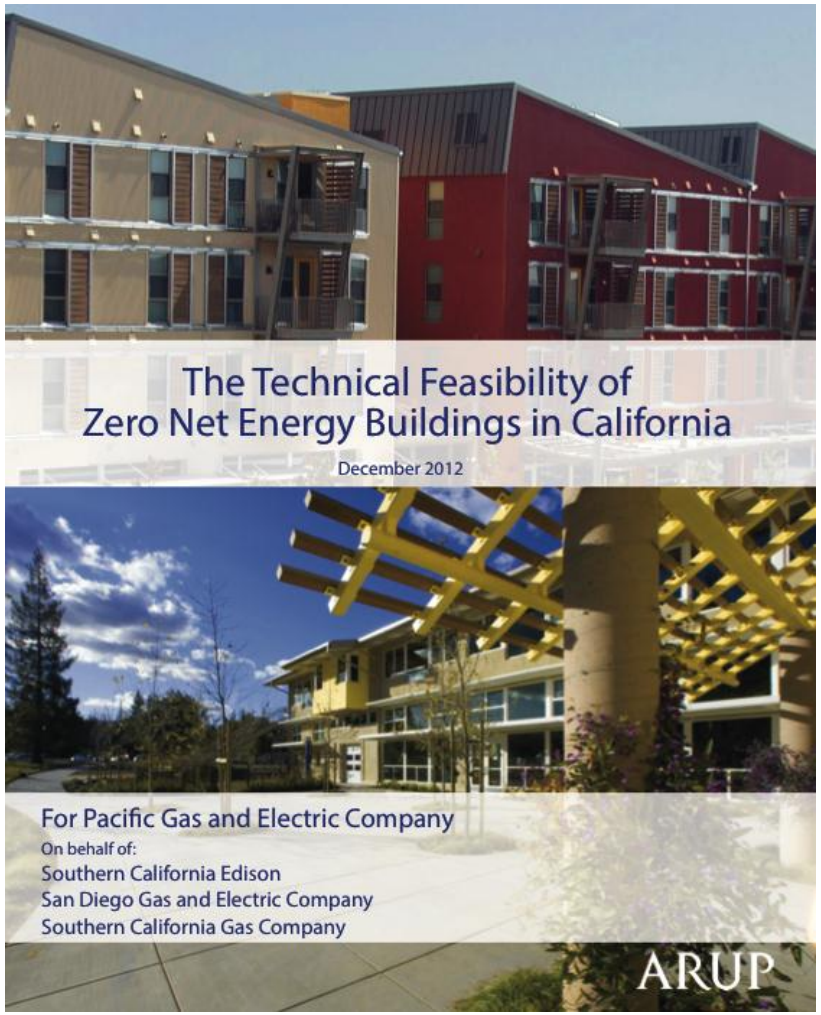
What's Been Done ?
CA Public Utilities Commission

- 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

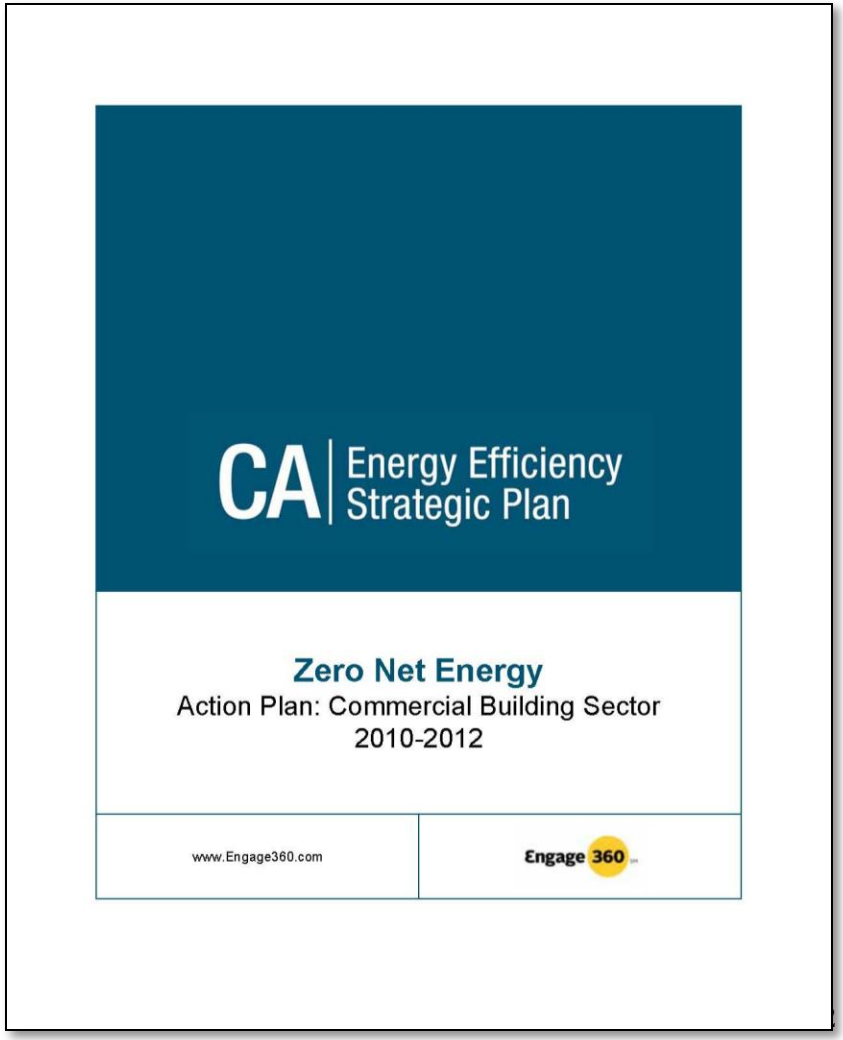


- ZNE and Sustainable Communities Pilot Projects
  - Demonstration Bldgs
  - Design guidance
  - Technical advice
  - Design competitions
  - Financial incentives
  - Technology trials
  - Contractor training

Also, the Road to ZNE: Mapping Pathways to ZNE Buildings in California (HMG, PG&E, 2012). Both available at www.calmac.org

What's Been Done ?
CA Public Utilities Commission

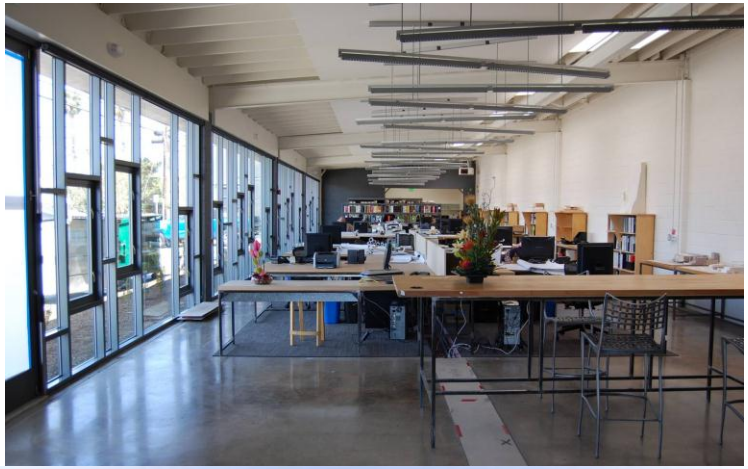
- Stakeholder engagement
- Case studies and information sharing
- ZNE Messaging Toolkit (NBI)



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

* Preliminary analysis performed by New Buildings Institute. Includes ZNE Ready and Near ZNE buildings. Not all verified.

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

* California ZNE Buildings Cost Study, Davis Energy Group for PG&E, 2012

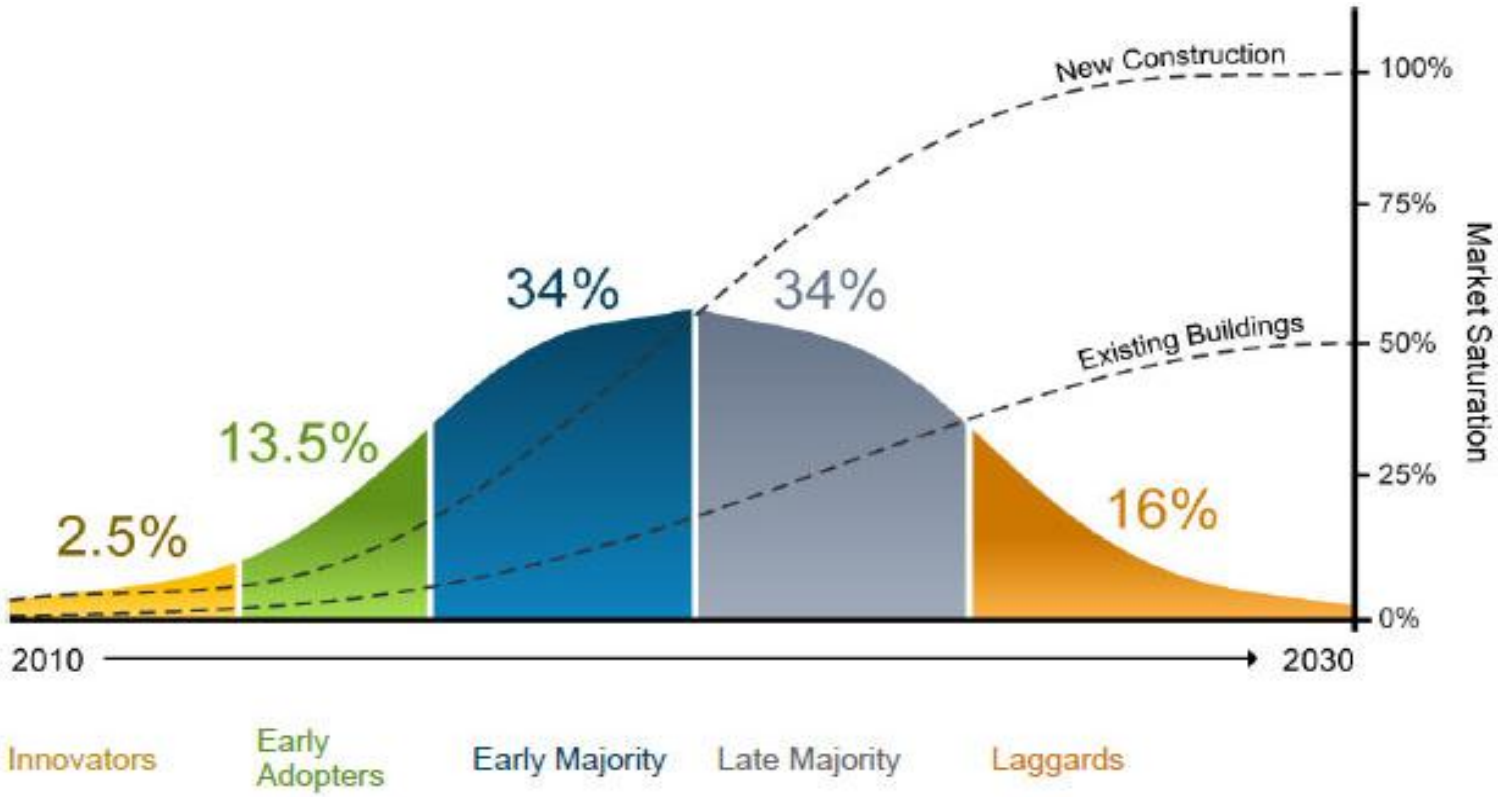
Challenges

- 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 ←→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

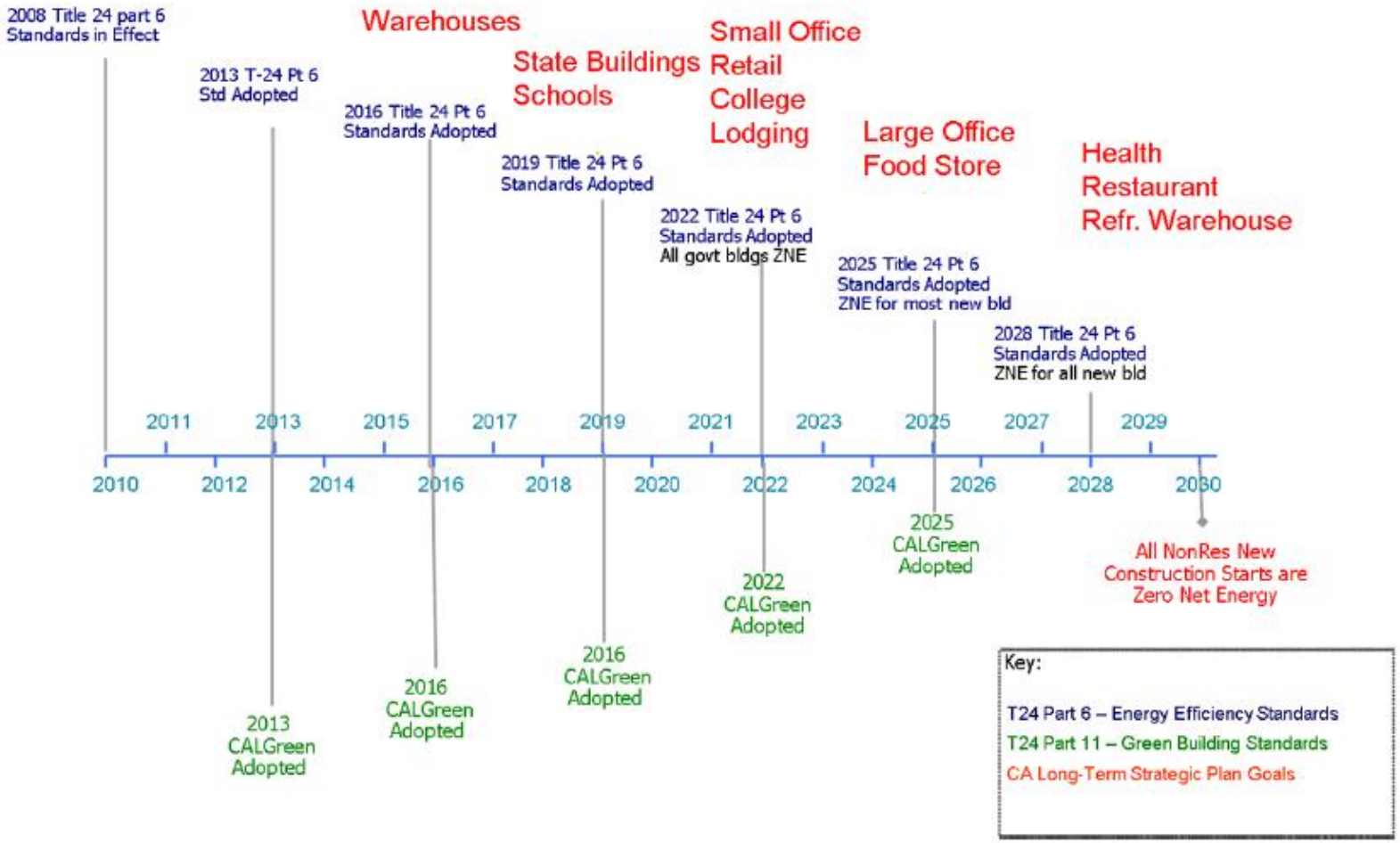
Recommendations

- 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



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

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.californiaznehomes.com/

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

Developed by Wakeland Housing with Energy Commission support, Global Green USA, Walker Wells

ABC Greenhome (SoCalEdison)

www.abcgreenhome.com

Project supported by Southern California Edison Sustainable Communities Project, John Morton

KB Home Zero House 2.0

KB Home, Ken Hilligoss; SDG&E provided technical support & incentives (Chip Fox)

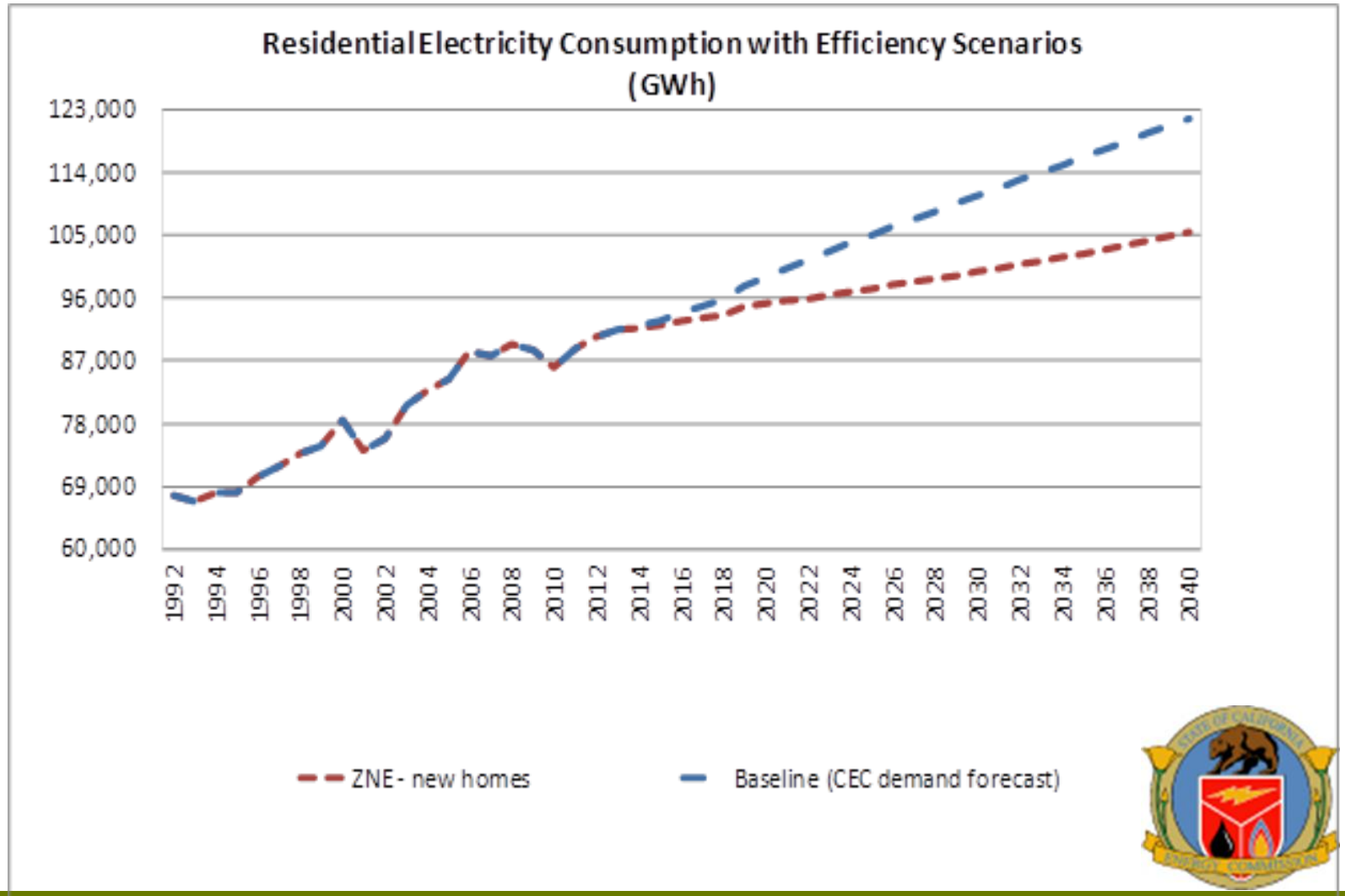
Irvine Smart Grid Demo
Tract home ZNE retrofit project

Joint project supported by ARRA funds, the Dept of Energy and Southern California Edison

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 (2nd Qtr 2012 – 2nd Qtr 2013)	Phase 2: Mid Term (2nd Qtr 2013 – 2nd Qtr 2014)	Phase 3: Long Term (2nd Qtr 2014 – 2nd 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