zero net energy commercial

Updating the CPUC's 2030 ZNE Commercial Building Goals

CalPlug Workshop | October 29, 2015

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IBEW Zero Net Energy Center, San Leandro

CALIFORNIA'S CURRENT POLICY ENVIRONMENT & COMMERCIAL ZNE BUILDING GOALS

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ZNE and Related State Legislation & Goals

- All new state buildings and major renovations starting design in 2025 shall be ZNE; 50% at 2020
- State agencies shall strive towards ZNE for 50% of existing state-owned building area by 2025.
- ARB 2014 Scoping Plan Update:
  - Consider Zero Carbon
  - Building Pathways (2017)
- New Legislation: AB 802 and SB 350
- AB 758: Existing Buildings

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California's Commercial ZNE Building Goals

Adopted 2007-08 by Energy Commission, CPUC

- All new commercial construction in California will be Zero Net Energy (ZNE) 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 Gilliland

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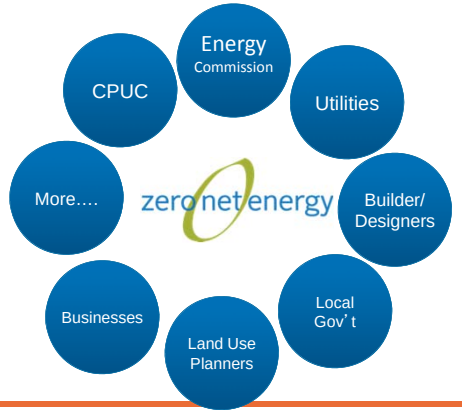
Who is involved in reaching CA's ZNE goals?



ZNE Code Buildings is CEC/ CPUC Policy Goal

- ZNE Code Buildings are "Administrative" goal -- not legislative mandate
- CEC/CPUC can advance ZNE Code Building goals within the agencies' current statutory authorities
  - ZNE Code Buildings included in Title 24 **if found to pass cost-effectiveness tests**
  - IOU programs support advancing ZNE Code Building goals within cost-effective portfolio

2010 Groundbreaking of IBEW Zero Net Energy Center, San Leandro

Exploratorium | San Francisco, CA

IDeAsZ^2 Office Building San Jose, CA

COMMERCIAL ZNE BUILDINGS IN CALIFORNIA

HOW MANY ZNE BUILDING ARE THERE?

Status of ZNE in California

- 70 ZNE commercial buildings since 2007*

SMUD East Campus Operations Center, Doug Norwood

DPR Construction San Diego Corporate Office, Chip Fox

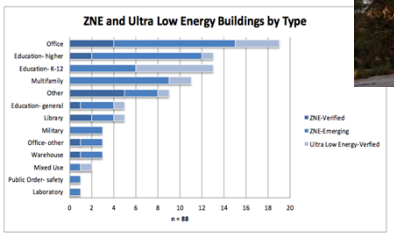
Bacon St. Offices, SDG&E & Hanna Gabriel Wells Architects

- *Buildings status data from New Buildings Institute. Not all verified.*

Current CA ZNE Buildings

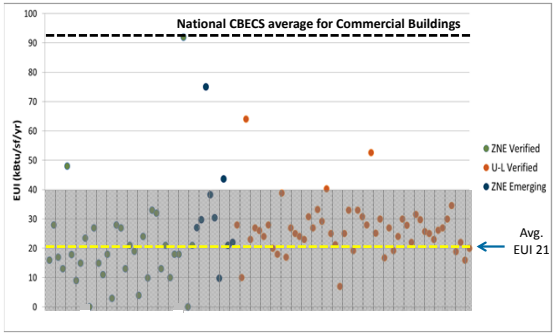
- 16 Verified ZNE buildings
- 54 Emerging ZNE buildings
- Many ultra-low energy buildings

David and Lucille Packard Foundation, Los Altos, CA



Performance Range

(measured performance data)



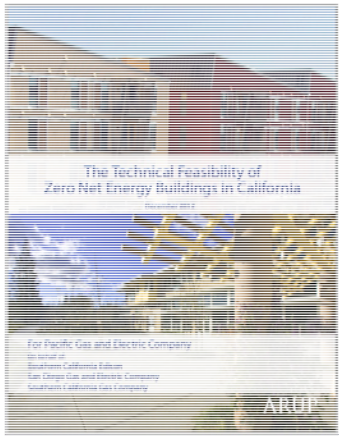
Developed by Wakeland Housing with Energy Commission support, Global Green USA, Walker Wells

ZNE BUILDINGS IN CALIFORNIA

CURRENT CHALLENGES

Feasibility

"The study's central finding is that ZNE buildings will be technically feasible for much of California's new construction market in 2020."



ZNE Cost Summary

- Commercial ZEBs have been built within standard construction budgets, and/or at the average cost of construction per square foot.
- Not everything that goes into the design and construction of a ZNE building adds costs. For example, reducing the amount of glazing increases the efficiency of a building while also reducing costs - it is a choice or trade-off.
- The integrated design process can lead to a variety of trade-offs including:
  - a reduction in the HVAC equipment sizing
  - a change to different equipment types and how heating and cooling are distributed
- Adding a PV array to the building has an incremental cost, with two additional dynamics at work;
  - Installed PV costs continue to drop, which complicates use of historic data.
  - The customer may choose to buy into a community system.

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Community Scale PV Options

- PVs can be difficult to install or inappropriate on many building due to shading, structural or ownership issues.
- Benefits: economies of scale, optimization of energy production and grid integration, a variety of financial or ownership models
- Industry around these larger installations
- Diversity of ownership models: Private, co-op, POU, etc.
- DOE SunShot Initiative recently provide $14 million to 15 awardees

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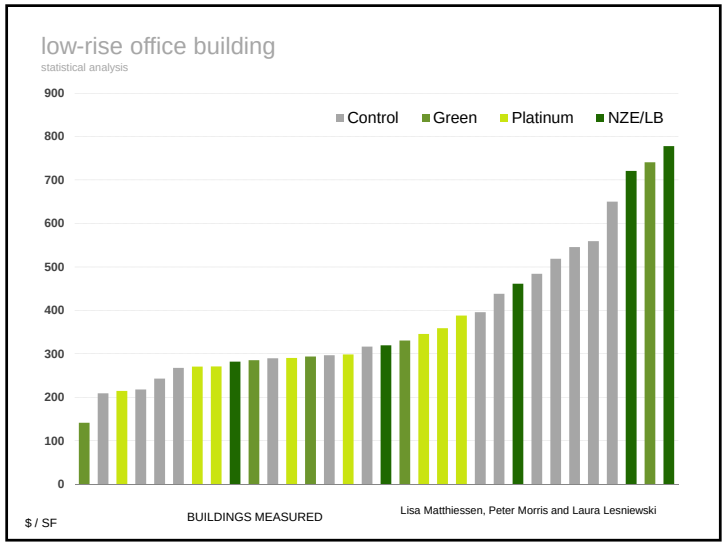
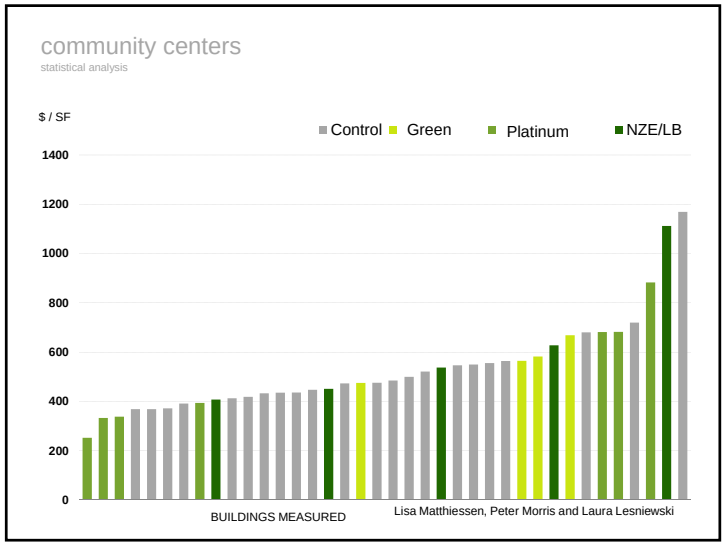
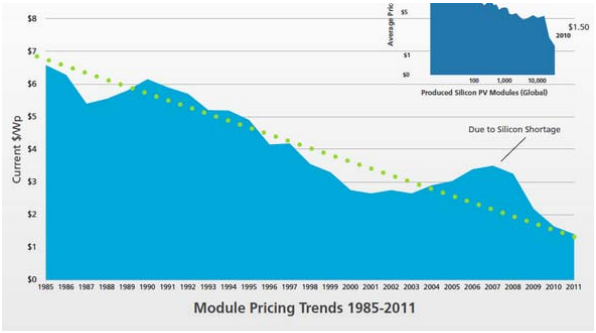




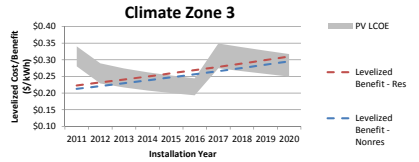
PV cost trend makes ZNE accessible

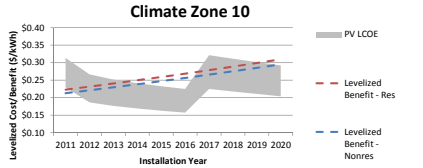


Source: P. Mints, Navigant Solar Services Program, 2011

But Declining PV Costs are Not A Sure Thing…

- Costs May Rise as Federal Solar Investment Tax Credit Ends
- NEM Policy Also Significant





Source: E3

Report Findings

- Costs for getting to zero are difficult to distinguish from overall project costs
- 1-12% premium for energy efficiency
- 5-19% for net zero energy
- ROI for energy efficiency alone 5-12%
- ROI for net zero up to 30%

www.newbuildings.org

→ 2012 PG&E Study found that ZNE Commercial buildings need not have any incremental cost

NET ZERO AND LIVING BUILDING CHALLENGE FINANCIAL STUDY:

A COST COMPARISON REPORT FOR BUILDINGS IN THE DISTRICT OF COLUMBIA

Policy Challenges. . .

- California Codes and Cost-effectiveness
  - Building Scale Limited
  - Appliance Standards & Plug Loads
- Net Energy Metering (NEM)/Surplus Compensation Rules discourage over-sizing PV systems
- Federal Solar Investment Tax Credit drops from 30% to 10% in 2017
- Administration, Program and Funding Silos
- Grid Integration

Energy Commission 2013 IEPR ZNE Building Definition

*"A ZNE Code Building is one where the **net of the amount of 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 reflects best practices for highly efficient buildings."* (IEPR 2013).

- In other words… A **ZNE (Code) Building Accomplishes Deep Energy Efficiency (and DR) first. Then produces as much onsite renewable energy in the course of a year as it consumes** (measured using TDV).
- **Can go beyond this!** Net Positive, Site Energy, Zero Carbon, etc.
- *Does not imply zero utility costs*

Market Challenges

- Awareness and commitment to market that ZNE is here to stay
  - Understanding of the Policy Direction and Definition of ZNE - TDV
- Long-term costs considerations
- Inconsistent capabilities for all buildings to achieve ZNE
- Professional Development & Training
- Valuation and Quantification of Benefits of ZNE
- Split Incentive and Landlord/Tenant Considerations

COMMERCIAL ZNE BUILDING IN THE CA EE STRATEGIC PLAN

UPDATING THE ZNE COMMERCIAL STRATEGIC PLAN CHAPTERS AND GOALS

Is Zero Net Energy the **Goal** or the **Vehicle**?

How does time impact us?

2020	2025	2030	2050

Stepped Carbon Reduction Strategies →

Working Vision for 2030 & 2050 replacing existing Big Bold Goal

Beginning in 2030, all new commercial buildings and major commercial renovations will be on the path to significantly reduce their carbon footprint by achieving zero net energy and functioning as integrated distribution resources.

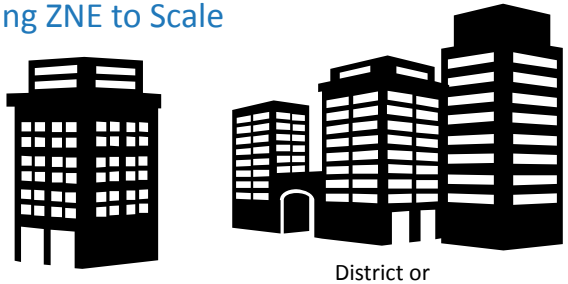
The scale of zero carbon efforts is expanded through integrated campus, district and community scale projects.

Emerging Goals Under Consideration

- By 2030, all new commercial buildings and major renovations will be designed and operated to be either Low-Carbon (ultra-low energy) or Zero Net Energy buildings.
- By 2030, at least 100 of California's commercial and institutional building campuses, districts and communities will be on the path to Low Carbon/Zero Energy Districts (ZEDs).
- By 2020, all new and renovated buildings and ZEDs are integrated distributed resource partners that support a more cost-effective and resilient electrical grid.

Focus Areas

Two levels of strategies – Getting ZNE to Scale



Building Scale

District or Community Scale

Community Scale DOES NOT Just mean Community Scale Renewables…

- Integrated Planning
- Opportunities to incorporate Transportation, Water, Sewage, Landscape
- Potential for Alternative Energy Sources
- Ability to leverage existing financing districts (i.e. lighting and landscaping, infrastructure, Business Improvement Districts)
- Grid Integration

Campus Districts

Pasadena Community College

University of California

District Scale?

Anaheim Triangle

Treasure Island

District Scale? Infill Building can trigger an entire Neighborhood

New Safeway, parking and small retail in existing mix use neighborhood

Infill Multifamily in Uptown Oakland

District Scale? New Streetscape/Specific Plan – Opportunity to Move to ZNE

San Pablo Avenue Specific Plan Development

San Bruno Downtown Development

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