



ZNE New Commercial Buildings Chapter for the Strategic Plan

September 25, 2015

Rory Cox, CPUC

Mindy Craig, BluePoint Planning

Dave Hewitt

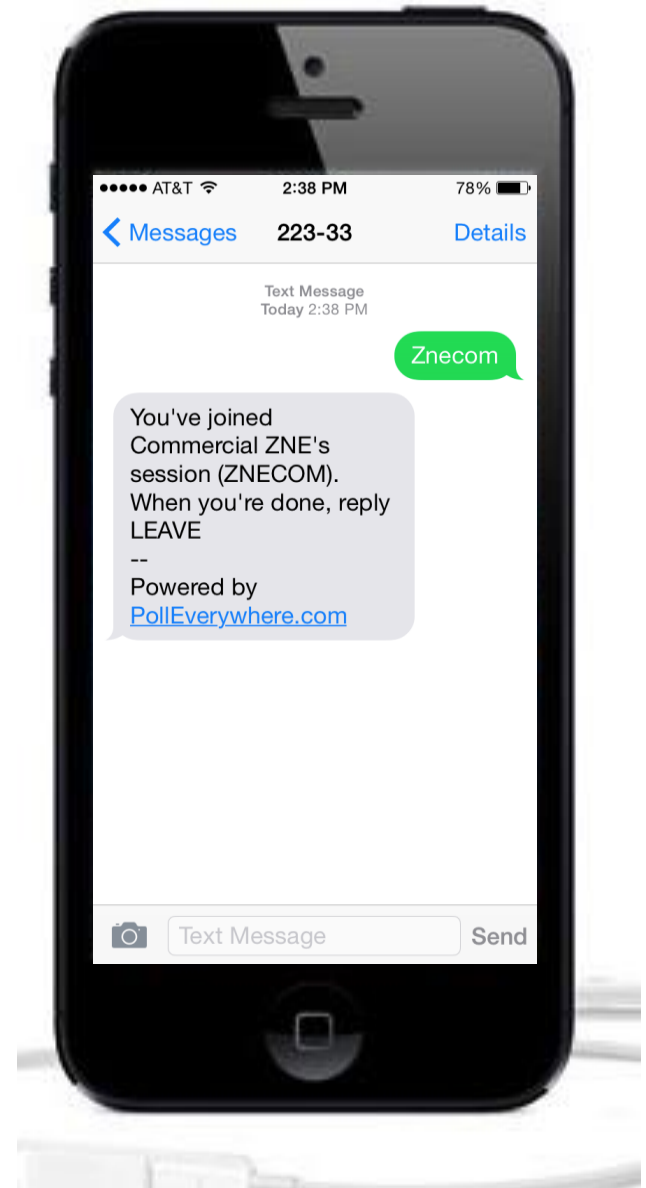
Rick Diamond, LBNL



Polling Instructions

Text “ZNECOM”
To “22333”

*You will get a notice
that you have joined
the session.*





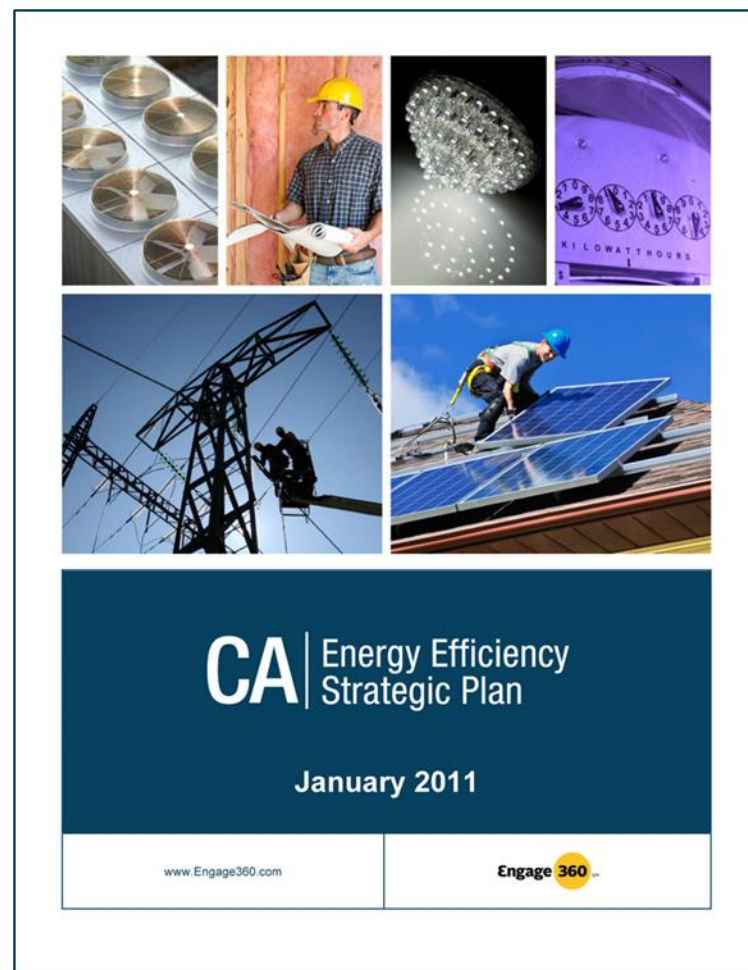
IDeAsZ² Office Building San Jose, CA

Introduction

UPDATING THE STRATEGIC PLAN

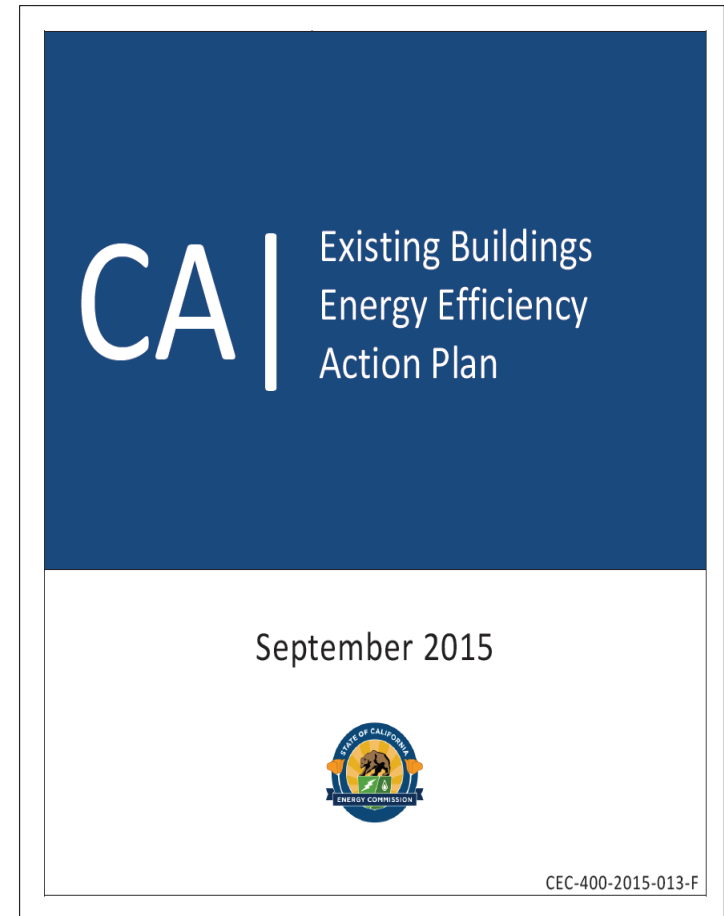
2016 Energy Efficiency Strategic Plan Update

- Strategic Plan not updated since 2008 (except Lighting chapter)
- **Big technological changes:** Smart meters, popularity of customer owned solar, electric vehicles, demand response
- **Policy changes:** SB 350, AB 802, AB 758, Rolling Portfolio Cycle, Time of Use rates, Title 24, etc.
- Need a Plan that puts us on a **path to 2030 targets**



2016 Energy Efficiency Strategic Plan Update

- Foundational documents
 - Existing Buildings Action Plan
 - Residential ZNE Action Plan
 - Pathways to 2030
 - AB 32 Investment Plan
- New Stakeholder Processes in Progress
 - Industrial
 - New Commercial
 - Agriculture



2016 Energy Efficiency Strategic Plan Update

- Consulting Team - Leads
 - Lead Author: Karen Herter
 - New Commercial: Mindy Craig
 - Industrial and Agriculture: Sergio Dias
 - Metrics Analysis: Navigant
- Schedule
 - October 13 and 14: Agriculture Workshops (SF and LA)
 - January 12 & 13 (tent.): 2 day workshop for all sectors
 - Publication date: April 2015
 - Chapter comment periods: As they become available



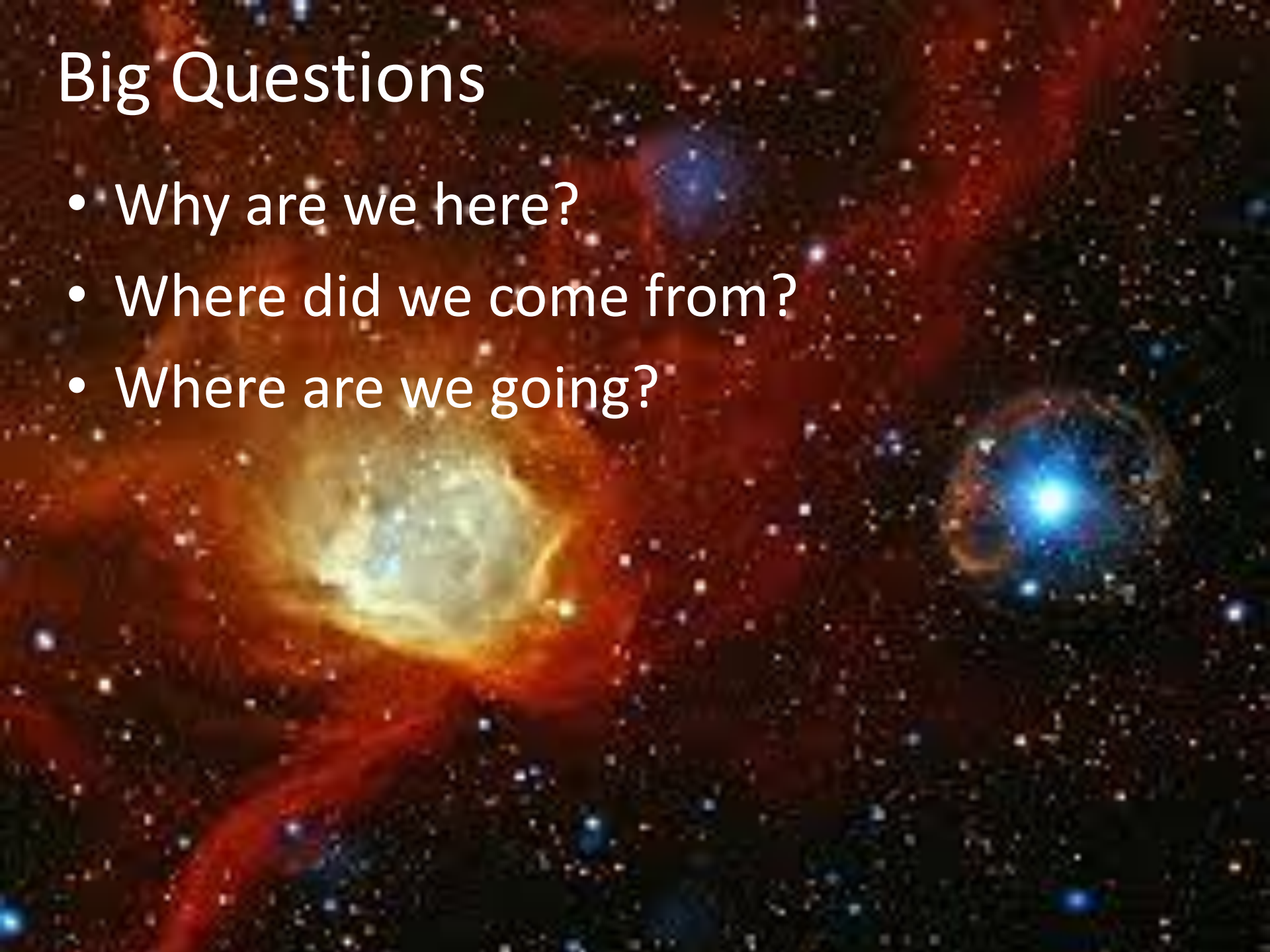
Exploratorium | San Francisco, CA

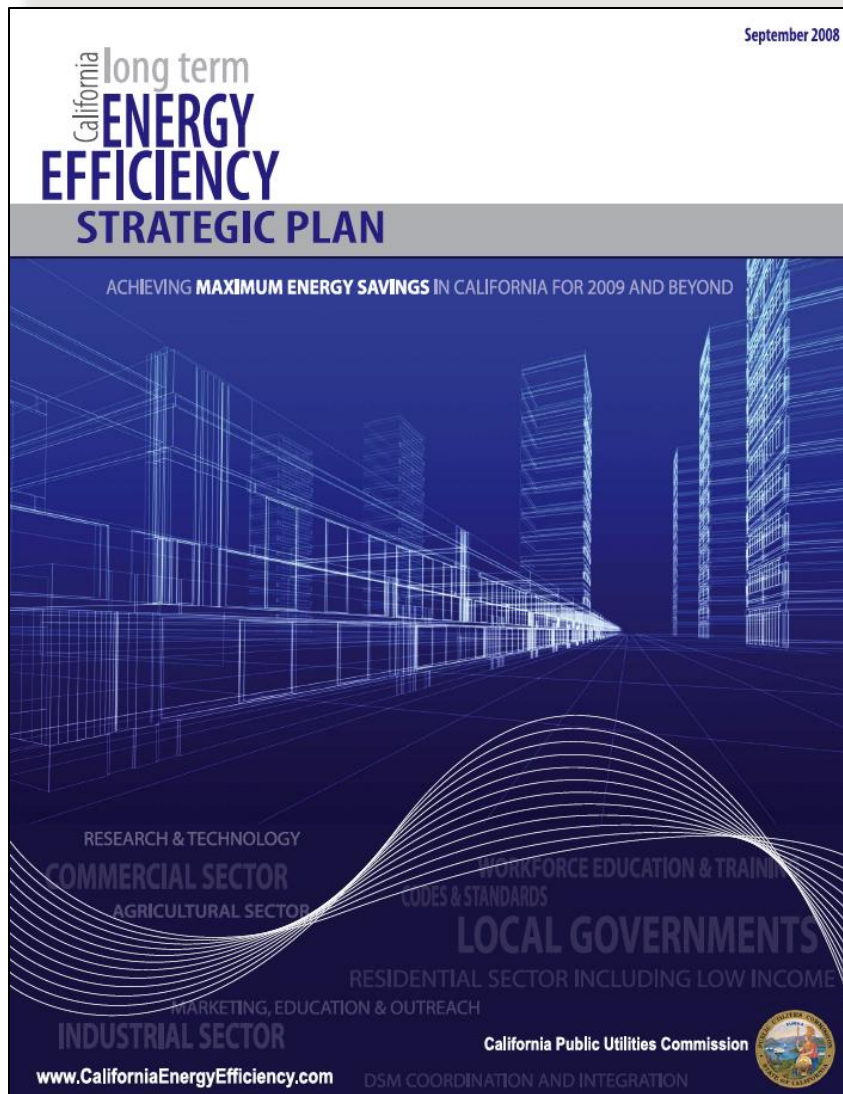
Context

PREVIOUS PLAN IDEAS, STRATEGIES AND LESSONS LEARNED

Big Questions

- Why are we here?
- Where did we come from?
- Where are we going?





**Getting Past Green to Zero Net
Energy Buildings: *The
California Long Term Energy
Efficiency Strategic Plan***

January 2008

Zero Net Energy Buildings in 2009 (N=8)



IDEAs Building, San Jose, California



Three Strategic Initiatives for the Commercial Sector



1. Adopt aggressive enhancement of **codes and standards** in California and their enforcement
2. Align labels, benchmarking, and operations & maintenance practices to **motivate and address energy efficiency** in existing buildings
3. **Target financing and incentives** to meet the objectives of the Strategic Plan

Three Enabling or Supporting Initiatives for the Commercial Sector



1. Promote **integrated design** as the basis for commercial building design, construction, renovations and occupancy
2. Support **targeted R&D** and emerging technologies for the most promising gains
3. Offer integrated **one-stop program delivery of Demand Side Management (DSM)** solutions (EE, DG, DR)

Three Cross-Cutting Initiatives for the Commercial Sector



1. Provide **comprehensive training and certification** to ensure knowledge among building professionals and technical personnel
2. Develop **capabilities of local governments** to drive EE solutions in communities
3. Target **marketing, outreach, and education** to spur the commercial sector market

Caveats About WHAT IS NOT in this 2009-2011 STRATEGIC PLAN

1. Related Work Underway Elsewhere:

- Water-energy nexus
- Transportation aspects of sustainable community development
- Impact of clean energy vehicles on gas & electricity demand
- EM&V strategies for new programmatic strategies

Caveats About WHAT IS NOT in this 2009-2011 STRATEGIC PLAN

2. Time and Resource Constraints Prevented Attention to Several Important Issues:

- Setting priority actions
- Estimating budget and resources needed
- Applying cost-benefit analysis
- Gaining leadership and action commitments from stakeholders

Strategic Planning (2013) [revised 2015]

What has changed in the seven years since the last California Energy Efficiency Strategic Plan?

1. Adoption of Cap & Trade in CA (early 2012)
2. Explosion in Big Data & Cloud Computing
3. Greater market penetration of EV/PHEVs
4. Need to bring dramatically more renewables online to meet the goals of AB32
5. Disclosure laws are more common; more communities are demanding transparent information (AB 1103 and AB 531 adopted 2012)
6. Automated DR is more widely available

2015 Context (cont.)

7. Cheaper natural gas (pros + cons)
8. SONGS down--less support for nuclear power
9. Advances in Prosumer & Consumer behavior
10. Cyber security technology for the grid
11. Cities adopting climate adaptation strategies
12. Two new cycles of Title 24 Standards (2009, 2013)
13. AB 758 (Retrofit of Existing Buildings)
14. PIER -> EPIC
15. Community Scale Solar taking off
16. Integrated DSM not delivering potential ...
17. Governor Brown



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

ZNE BUILDINGS IN CALIFORNIA

TODAY . . .

POLL 1. Where is California on its path to meeting ZNE Goals?

- A. Well on the way!
- B. Strong foundation
- C. Just begun
- D. Minor successes
- E. Nowhere near

Status of ZNE in California

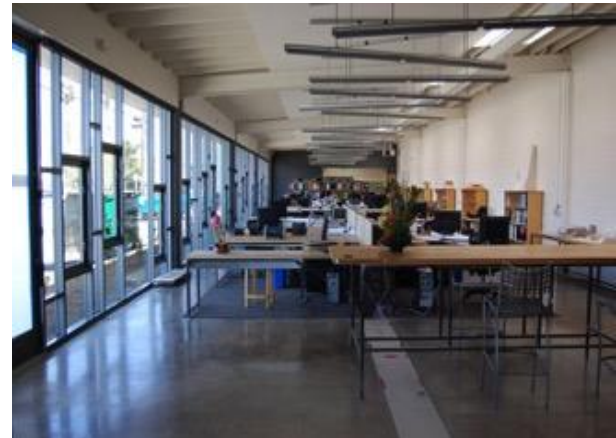
- 70 ZNE commercial buildings since 2007*



SMUD East Campus Operations Center, Doug Norwood



DPR Construction San Diego Corporate Office, Chip Fox



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

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

California ZNE Watchlist

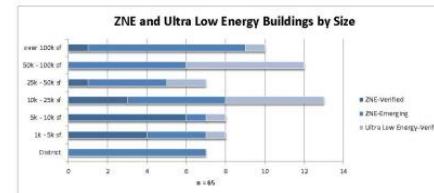
California leads the country in both policy and projects that are laying the path to a zero net energy (ZNE) future. California state agencies have adopted goals for 100% of new and 50% of existing commercial buildings to be ZNE by 2030. Leading design firms and owners have already recognized the real estate and occupancy advantages of these high performance buildings and today California has over 50 commercial buildings either verified (16) as ZNE or emerging (34) toward that target.

This CA ZNE Watchlist tracks commercial buildings (including multi-family) based on information gathered by New Buildings Institute (NBI) from multiple sources including designers, owners, utility programs, private and public organizations, articles, e-news, research, and commercial real estate professionals. It serves, along with other available ZNE resources¹, to support the awareness, acceptance and adoption of ZNE goals and outcomes throughout California and the nation. Buildings with ultra-low energy performance comparable to ZNE are also included.

The graphics below show the trends in location, type and size of the ZNE buildings in California.



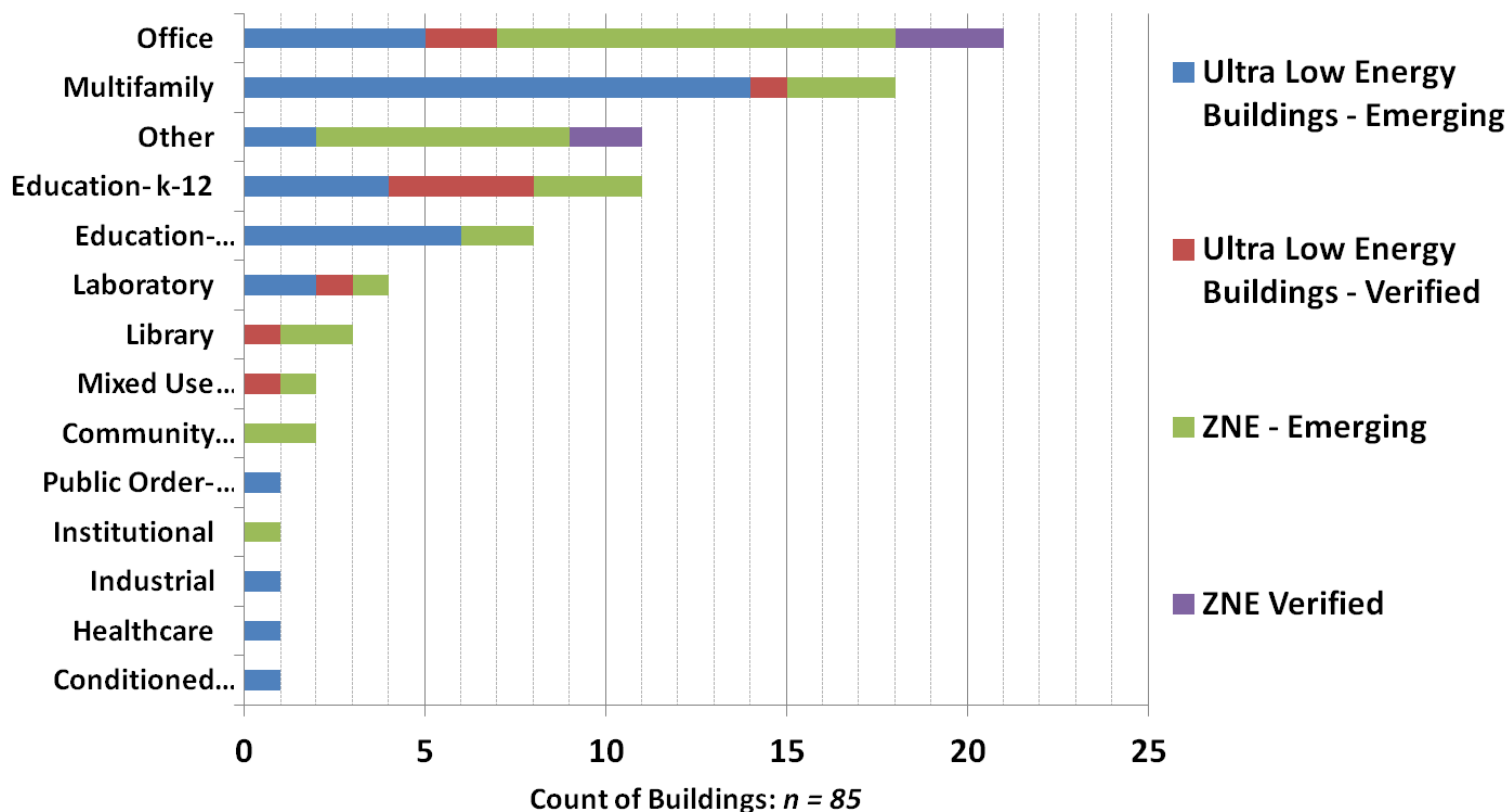
Locations of CA ZNE Verified and Emerging ZNE Building. Dot size represents volume of buildings.



¹ For more resources: CPUC (<http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/Zero+Net+Energy+Buildings.html>) and NBI (www.newbuildings.org/zero-energy)

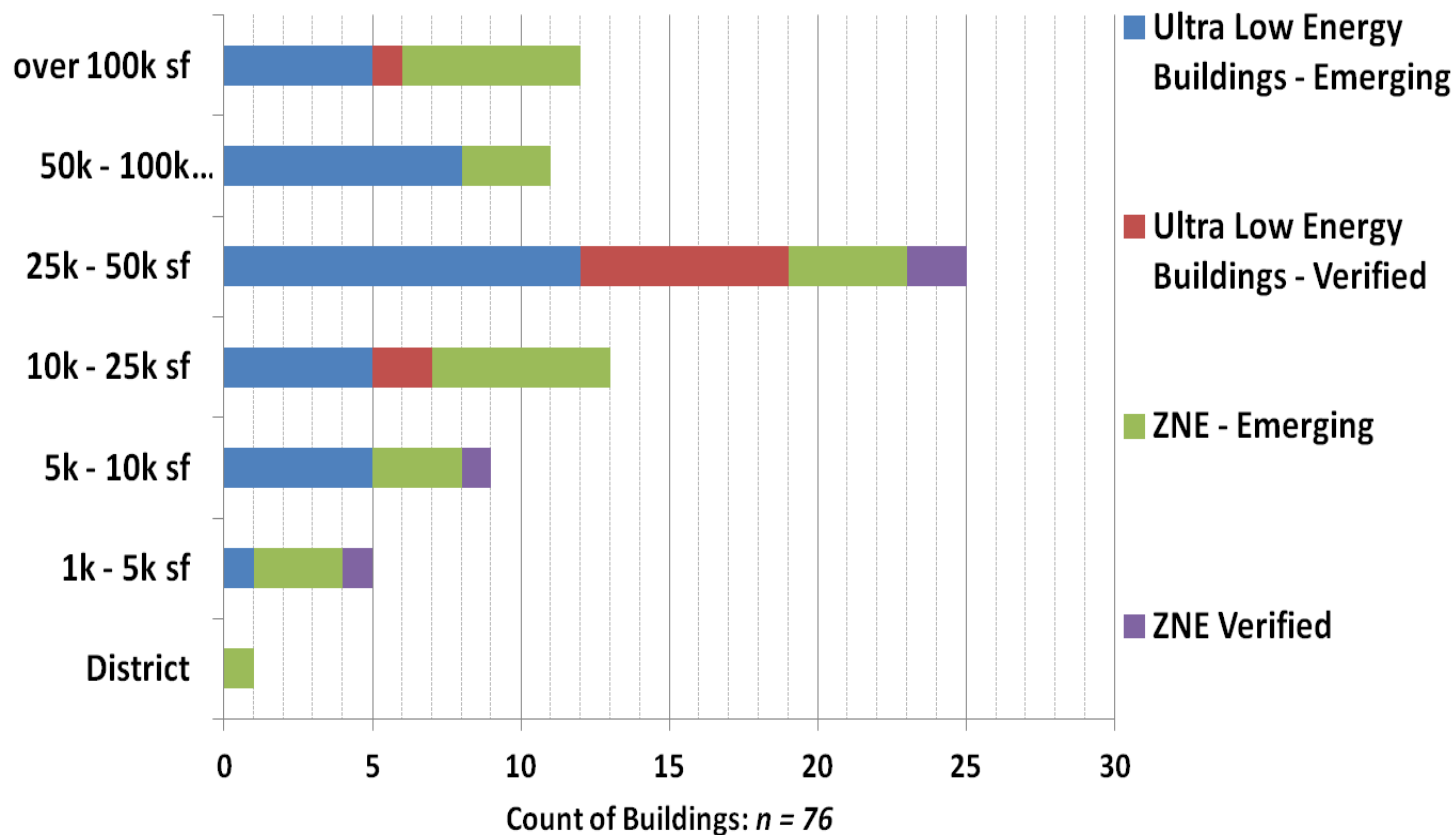
CA ZNE/Ultra-Low Building Types

Count of Buildings by Type

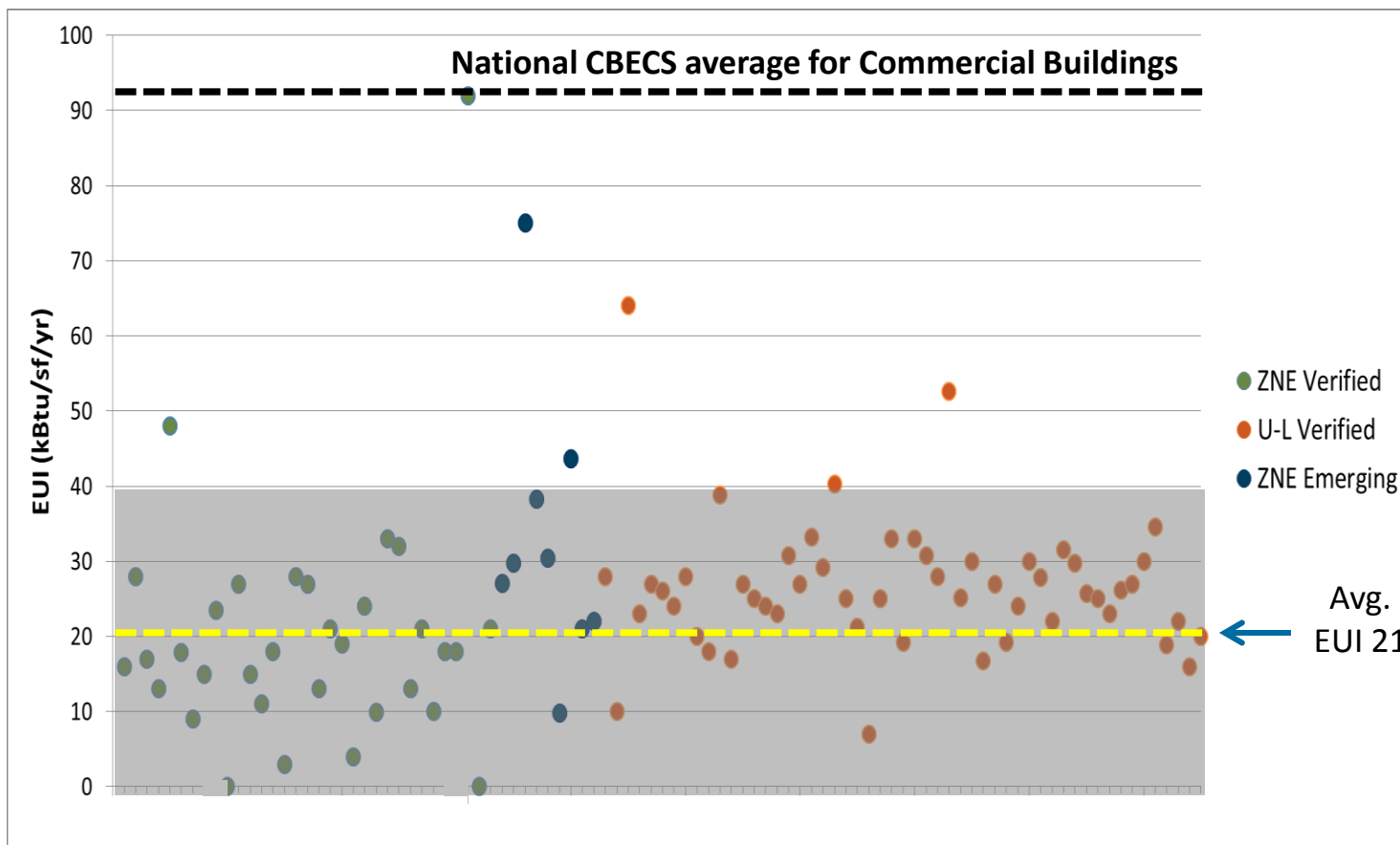


CA ZNE/Ultra-Low Building Size

Count of Buildings by Size

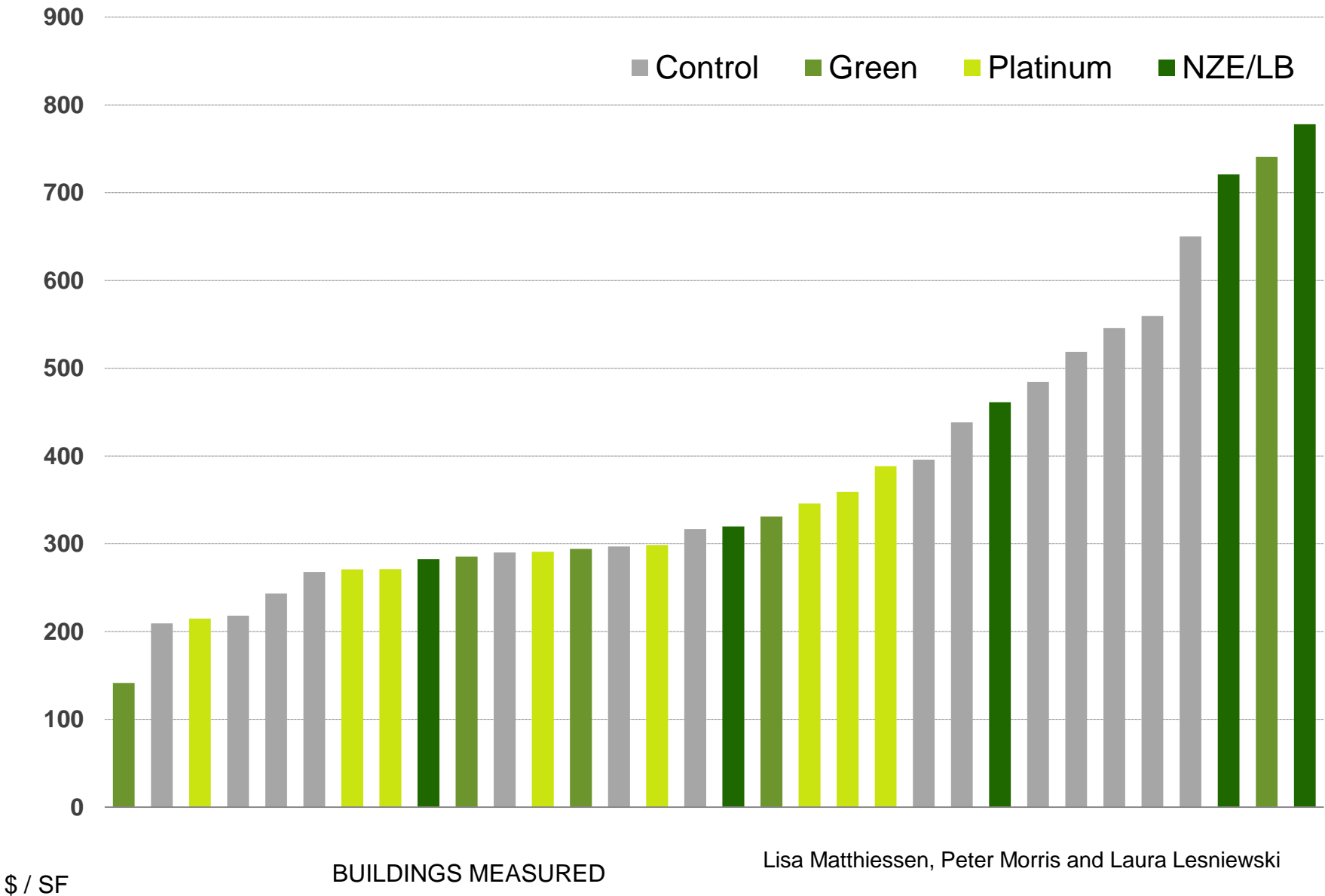


Performance Range (measured performance data)



low-rise office building

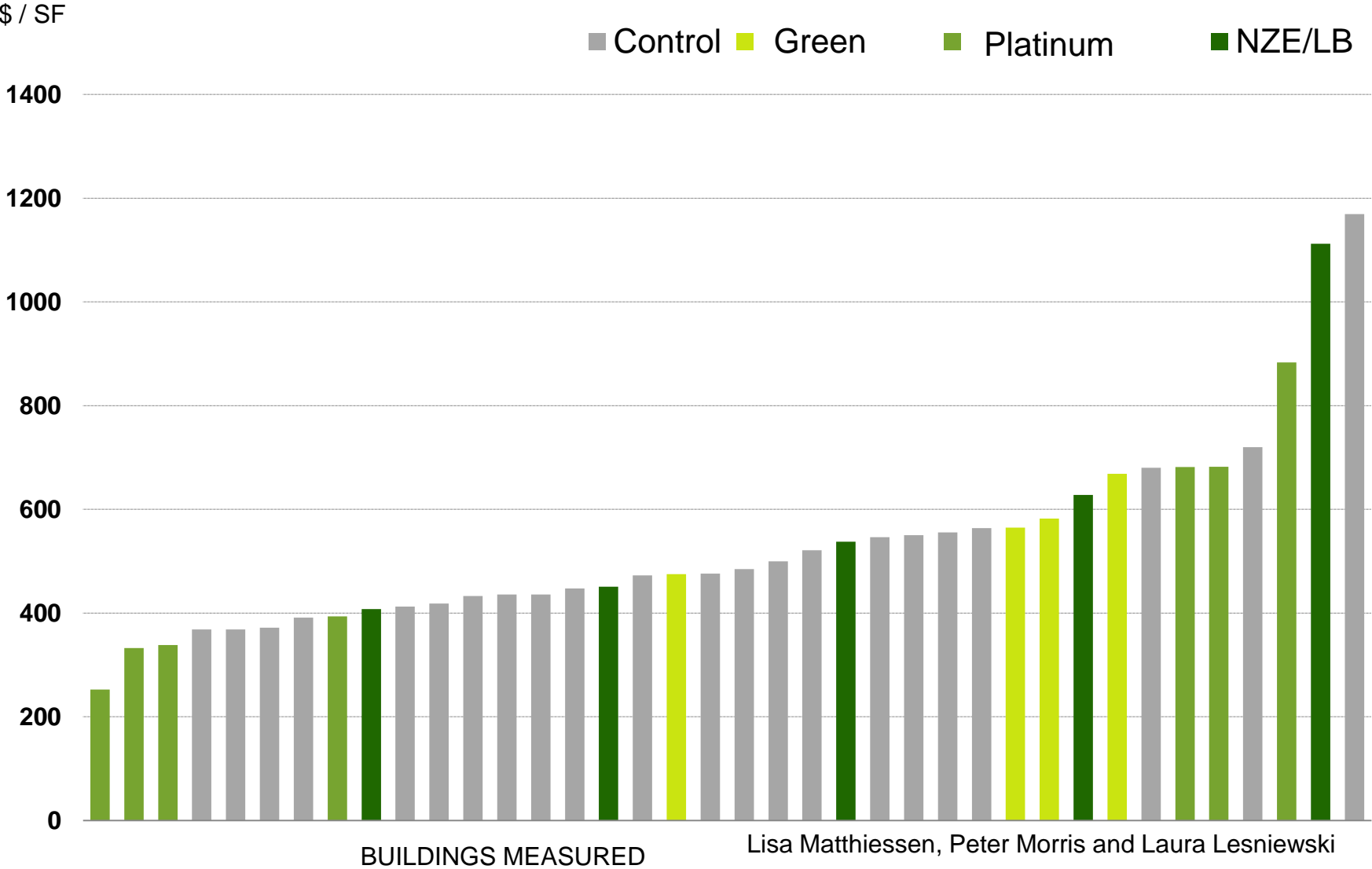
statistical analysis



Lisa Matthiessen, Peter Morris and Laura Lesniewski

community centers

statistical analysis



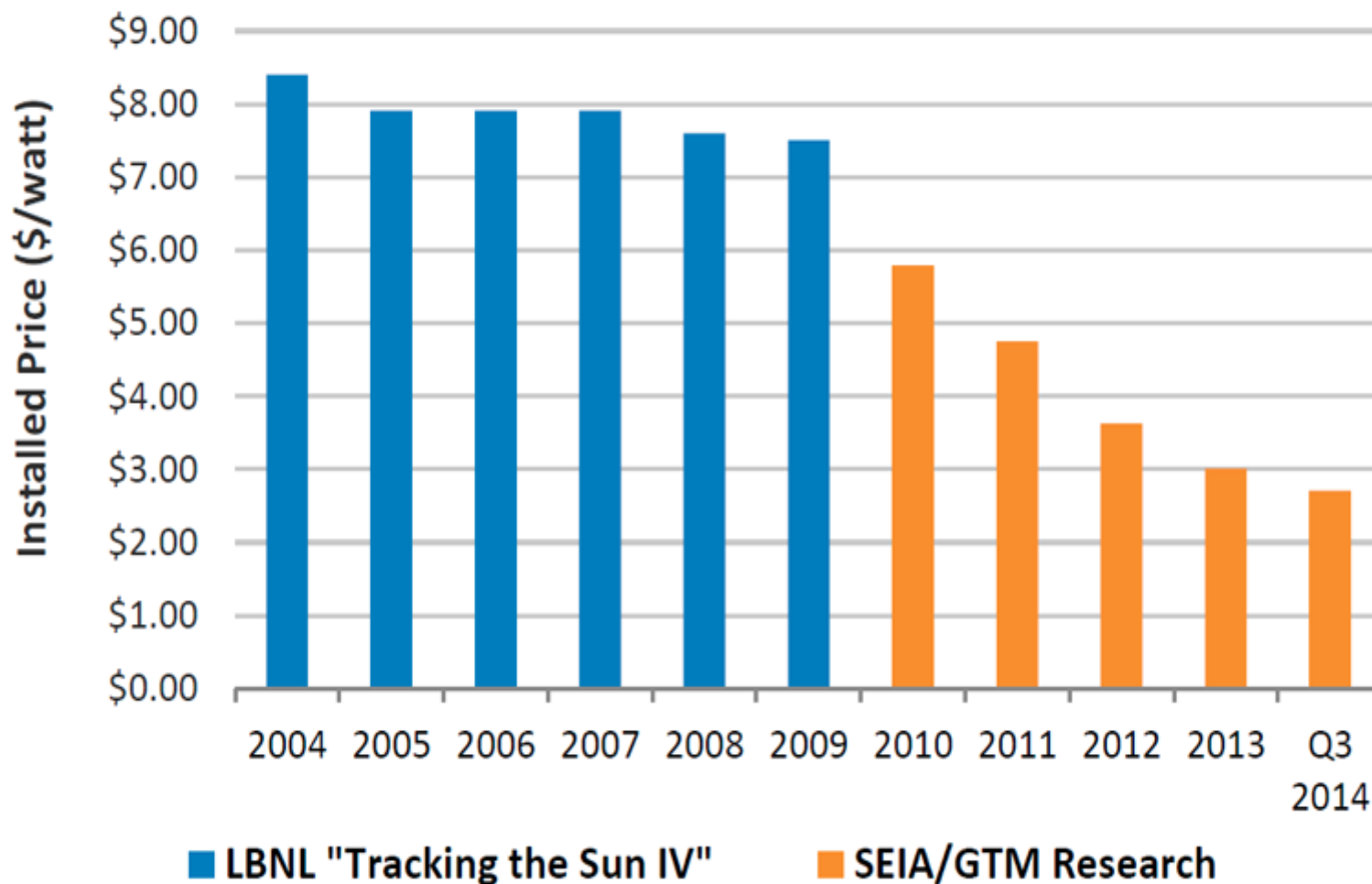
ZNE Cost Summary

- 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.

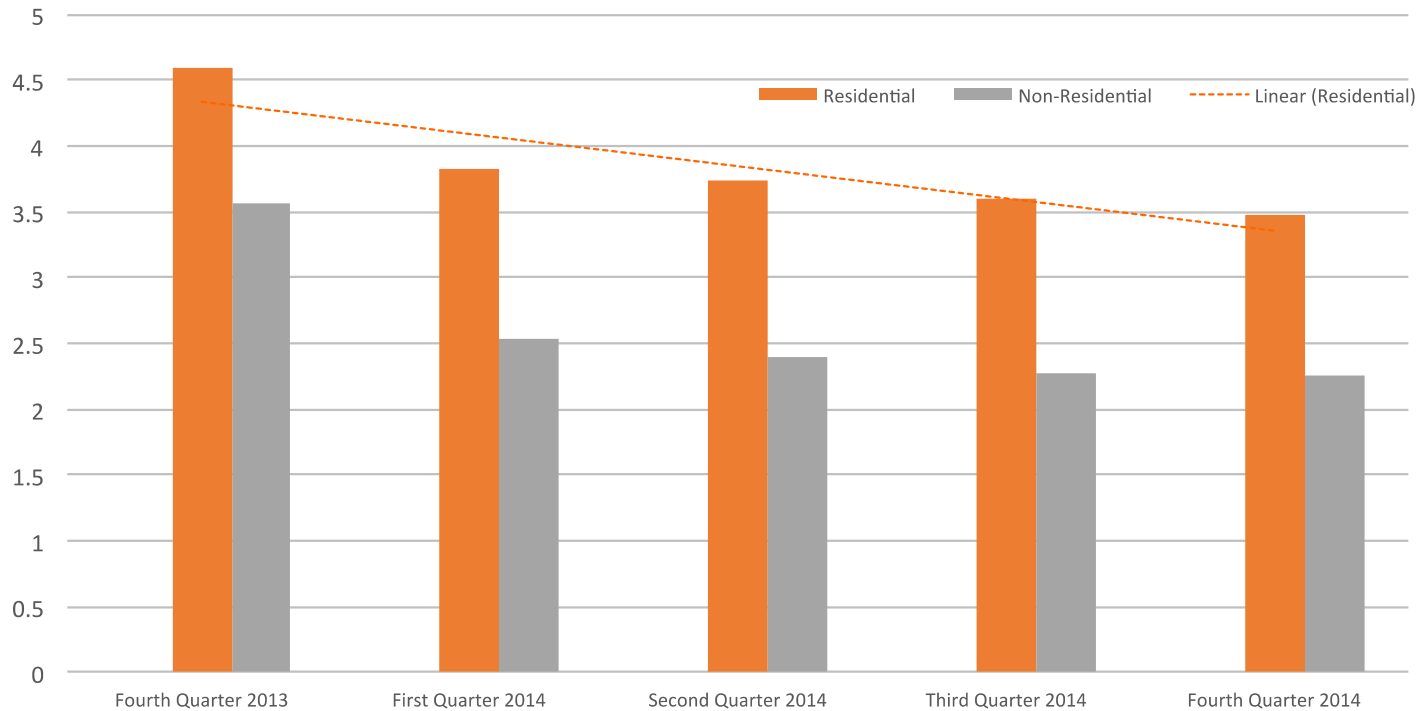
ZNE Cost Summary continued

- 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.

Average PV System Prices



Residential and Commercial/Community PV Costs



Demand-side PV installed costs have decreased to \$3.48 per installed watt for residential and \$2.25 for non-residential.

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

ZNE Studies, Pilots and Information (2010-14)

nbi new buildings institute

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Getting to Zero Buildings Database

Welcome to the NBI Getting to Zero Buildings Database! NBI works to identify, research, analyze and promote commercial buildings that are leaders in low- and -zero energy performance outcomes. Here you will find in-depth information about high performance buildings across the United States, Canada, and beyond. The database includes information on measured and modeled energy performance, environmental characteristics, design process, finances, and other aspects of each project. Members of the design and construction teams are listed, as are sources for additional information. The data accessed here is also stored in the US Department of Energy High Performance Buildings Database.

- **ZNE Verified:** Indicates NBI confirmed the measured energy data met ZNE.
- **ZNE Emerging:** Indicates NBI identified the building is targeting ZNE but is still in design/construction, has less than a year of data, or has not yet achieved ZNE.
- **Advanced Building:** Building adheres to NBI's New Construction Guide, which requires performance well beyond code.

Search the building database

NBI Featured Project

Bullitt Foundation Cascadia Center
Building Type(s):
• Office
Gross Area: 51,990 ft²
Project Scope:
Completion Date: Apr 2013
[Learn more about this project](#)

Most Popular

Alfred A. Arraj United States District Courthouse
Target Energy Upgrade
William J. Clinton Presidential Center
The Chesapeake Bay Foundation's Philip Merrill Environmental Center
IRS Kansas City Campus
[Read More](#)

Most Recent

Newport Beach Environmental Nature Center
Portland State University Shattuck Hall
Iowa Utilities Board Office of Consumer Advocate Office Building
Pearl Brewery/Full Goods Warehouse
Mercer Slough Environmental Education Center
[Read More](#)

Featured Views

ZNE Verified
ZNE Emerging
Advanced Buildings
Submit a Project
Want to contribute? Submit a Project.
Resources:
The Getting to Zero Project Portal is an access point to the DOE's High Performance Buildings Database. For more information on the database [click here](#).

- Prop 39 Pilots
- IOU ZNE and Sustainable Communities (IDSMS) Pilots
 - Demonstration Bldgs
 - Design guidance
 - Technical advice
 - Design competition
 - Contractor training
- “Road to ZNE” study
- ZNE Technical Feasibility Study
- Building Case studies
- NBI ZNE Messaging Toolkit
- Early Adopter Training Series
- ZNE Newsletter & Website



IBEW Zero Net Energy Center, San Leandro

California Big Bold Goals

COMMERCIAL ZNE BUILDING GOALS

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

California State ZNE Goals

Adopted by Executive Order in 2012 + +

- 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)
- SB 350: 50% increase in energy efficiency for existing buildings/50% increase in renewables by 2030



A Few Challenges. . .

- California Codes and Cost-effectiveness
- Net Energy Metering (NEM)/Surplus Compensation Rules discourage over-sizing PV systems
- Federal ITC drops from 30% to 10% in 2017
- Awareness and commitment to market that ZNE is here to stay
- Long term costs
- Inconsistent capabilities for all buildings to achieve ZNE
- Grid Integration
- Professional Development & Training



Chartwell School | Seaside, CA

Updating Goals and Strategies. . .

ZNE COMMERCIAL STRATEGIC PLAN CHAPTER

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

How does time impact us?

2020	2025	2030	2050
------	------	------	------

Stepped Carbon Reduction Strategies



POLL 2. Should ZNE be considered the goal or a vehicle to reach our state goals?:

- A. ZNE is the Right Goal
- B. Carbon is the Right Goal
- C. We need both of them as Goals
- D. ZNE now, Carbon by 2050+

Strawman Vision for 2030, 2050 replacing existing Big Bold Goal

California will move along a clear path for all new commercial buildings and major renovations 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.

Proposed Goals Under Consideration

- By 2030, all new commercial buildings and major renovations will be designed and operated to be either Ultra-Low Energy (low carbon) 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 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

Increase
Awareness
&
Leadership

Build the
Profession

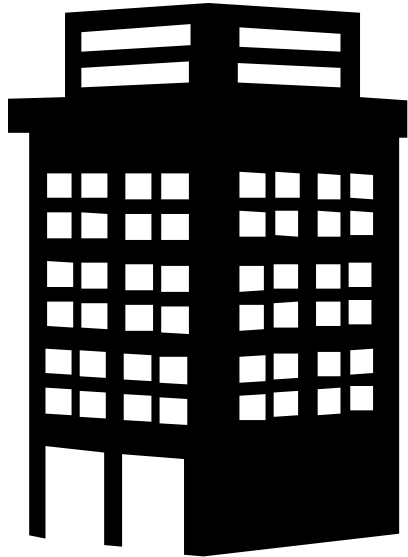
Expand
Technology
Research
& Development

Utilize Data
to Drive
Decision
Making

Optimize
the Grid

Align Policy

Two levels of strategies



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



POLL 3. Should the Plan address ZNE for:

- A.** Buildings Only
- B.** Buildings & Districts Separately
- C.** Buildings & Districts As One
- D.** Districts Only

Key Principles to keep in mind . . .

- Integrated Solutions
- Targeted & Phased
- Leverage
- Performance Driven
- Multiple Paths
- Scalable
- Achievable

**POLL 4. In a word, what is the
number one priority for achieving
the State's ZNE Goals?**

*(type in one word for each text –
you can do it several times)*

Break Out Groups

- 2 Rounds – Everyone can go to two Focus Areas
- Review the general strategies and use Discussion Questions on each table
- One person will stay at table for both rounds to help guide discussion and report back
- Report Back:
 - Identify Primary Transformational Activity
 - Identify top 3 critical strategies
 - Indicate leads and potential funding



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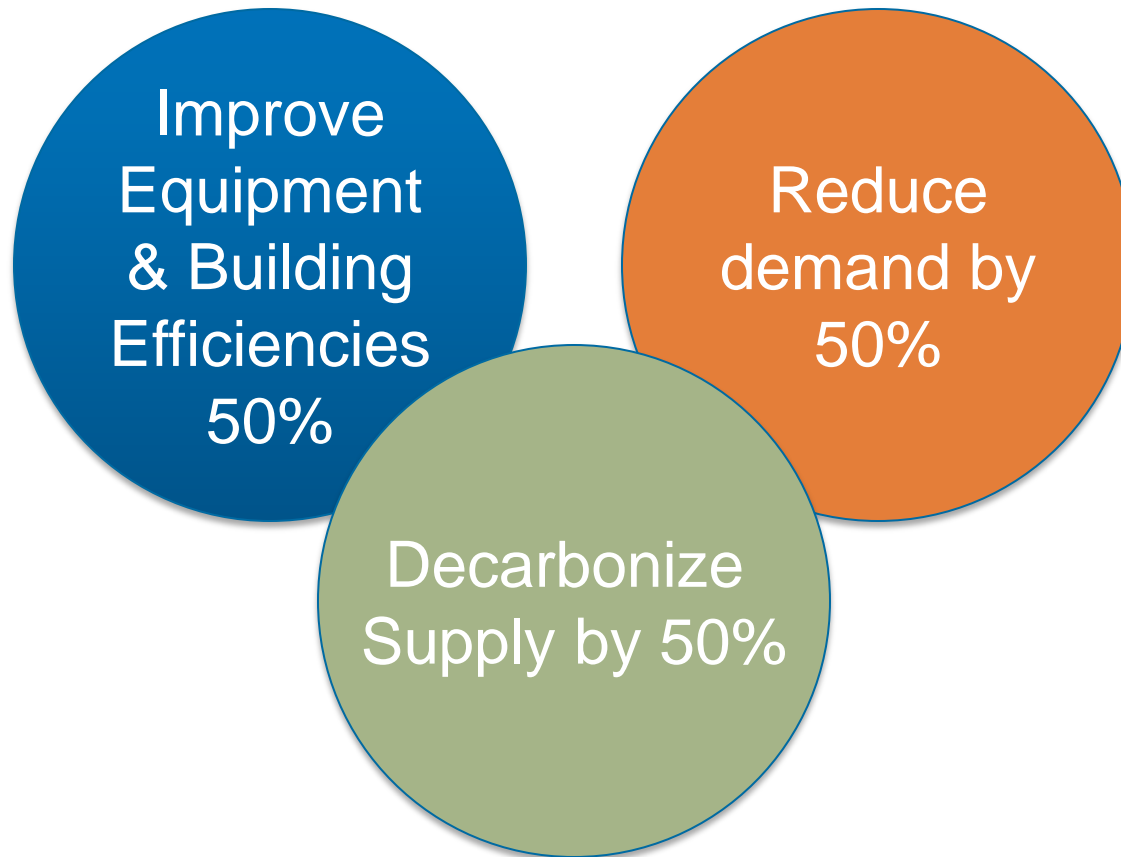


NEXT STEPS Anticipated

COMMISSION ADOPTION

- **Ensure IOU 2009-2011 EE program portfolio applications (filed July 21) are consistent with Strategic Plan**
- **Organize working apparatus for:**
 - more detailed analysis and prioritization
 - resource and leadership commitments
 - multi-stakeholder collaborative action
- **Identify oversight mechanisms to review progress of utility and non-utility actions**

If California could. . .



We could meet our goals!

CPUC Role



CPUC could play several roles in shaping the statewide energy policy vision, including:

- Convening key players
- Crafting the vision
- Providing the technical and policy analysis for the plan
- Communicating the plan

1. Increase Awareness & Leadership

- Demonstration Projects
- Recognize Leadership
- Community & Building Scale Awareness
- Commitment Campaign

2. Build the Profession

- Training & education for:
 - Architects & Engineers
 - Contractors
 - Builder Operators
 - Community/Land /Transportation Planners
 - Development Community

3. Expand technology R & D

- R& D for building related systems
- Enhanced modeling
- Building scale distributed resource tools
- R & D and demonstration of grid integration at campus/community scale
- New tools to analyze grid at community level
- Integrate electric transportation, alternative energy at community scale