



getting to zero national forum
at the
2013 NASEO Annual Meeting
Framing the policies, programs and projects that will drive zero net energy buildings

Getting to Zero

NBI 2014 Study *Preliminary Results*

Denver, CO - September 17, 2013

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Research Director

nbi new buildings
institute

Today's Topics

1 Preliminary Findings

2 Resources & Registry

3 Food for thought

Your input on 3 quick polling questions



Background

Getting to Zero 2012 Study

- First national status report on ZNE buildings
- Includes:
 - lists of buildings
 - building characteristics
 - design strategies
 - technologies
 - costs
 - actual and modeled energy performance
 - project profiles



nbi new buildings institute

research report
March 2012

Getting to Zero 2012 Status Update:
A First Look at the Costs
and Features of Zero Energy
Commercial Buildings

With support from:

NASEO National Association of State Energy Officials

COMMERCIAL BUILDINGS CONSORTIUM

2013 ZNE Study Update

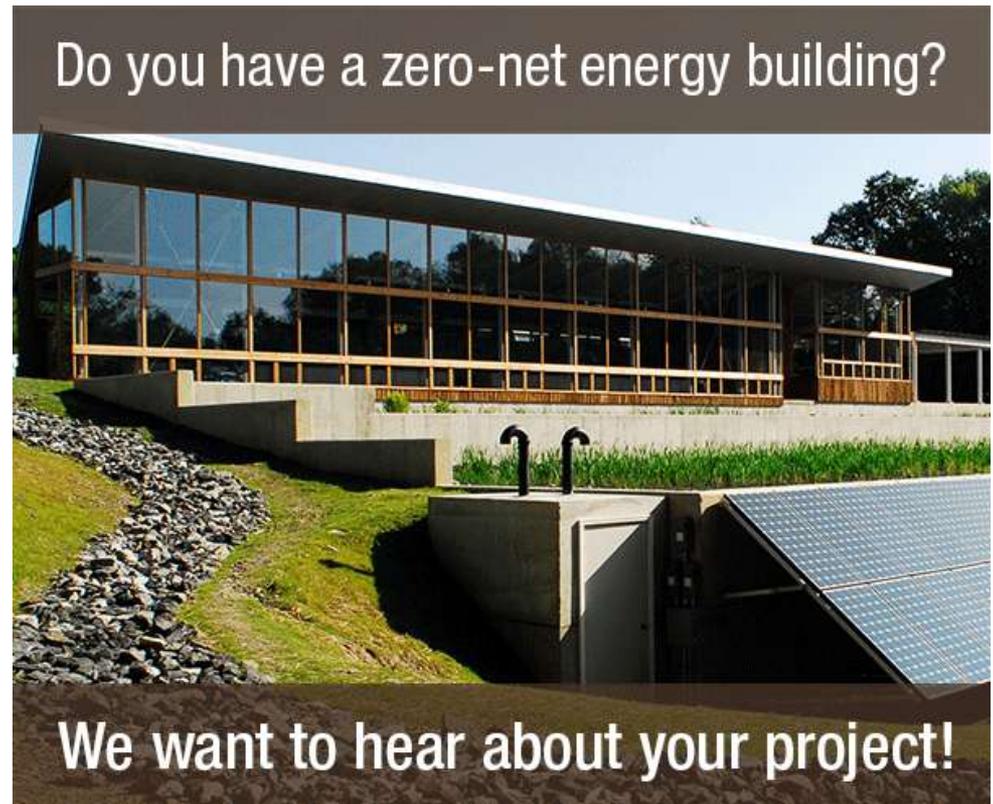
- Expanded list of buildings
- Update 2012 info
- Expanded section on state policies and policies and program support

To be released Q4 2013



Sources of Info

- Design firms
- Articles, awards
- Utility and state programs
- Related programs
 - USGBC LEED
 - Living Buildings Challenge
 - AIA
 - DOE HPB database



NBI Registry:
Ultra-low and
Zero Net Energy Buildings

Terms:

@ the **Site** - *energy and renewables*

- **Zero Net Energy Building (ZNE Building)**

- *a building that generates onsite at least as much energy as it uses over the course of a year*

- **Energy Use Index (EUI)**

- *energy use in thousands (k) of British thermal units (Btu) per square foot (sf) of the building per year (yr). Example: An **EUI of 32** kBtu/sf/yr*

In this Study

- **ZNE Buildings:**

- **ZNE-Actual** - 1 year or more of measured energy data at ZNE performance reviewed by a third party
- **ZNE-Emerging** – net zero targets but early in design, operations or data not yet reviewed

- **Ultra-low Energy / ZNE-Efficient Buildings**

- **Low-energy building** compared to peer energy use. **Not currently targeting net-zero** performance through onsite renewables. May be pursuing ZNE through district or renewable energy credits.

What we found: Bldg. Counts

	ZNE Buildings		Total ZNE
Yr	Actual	Emerging	
2012	21	39	60
2013	29	111	140

Draft 2013 ZNE Counts – List to be distributed at the reception



Edith Green Wendell Wyatt Court House, Portland, OR

ZNE

Actual

$n = 29$

ZNE Buildings

$n = 140$

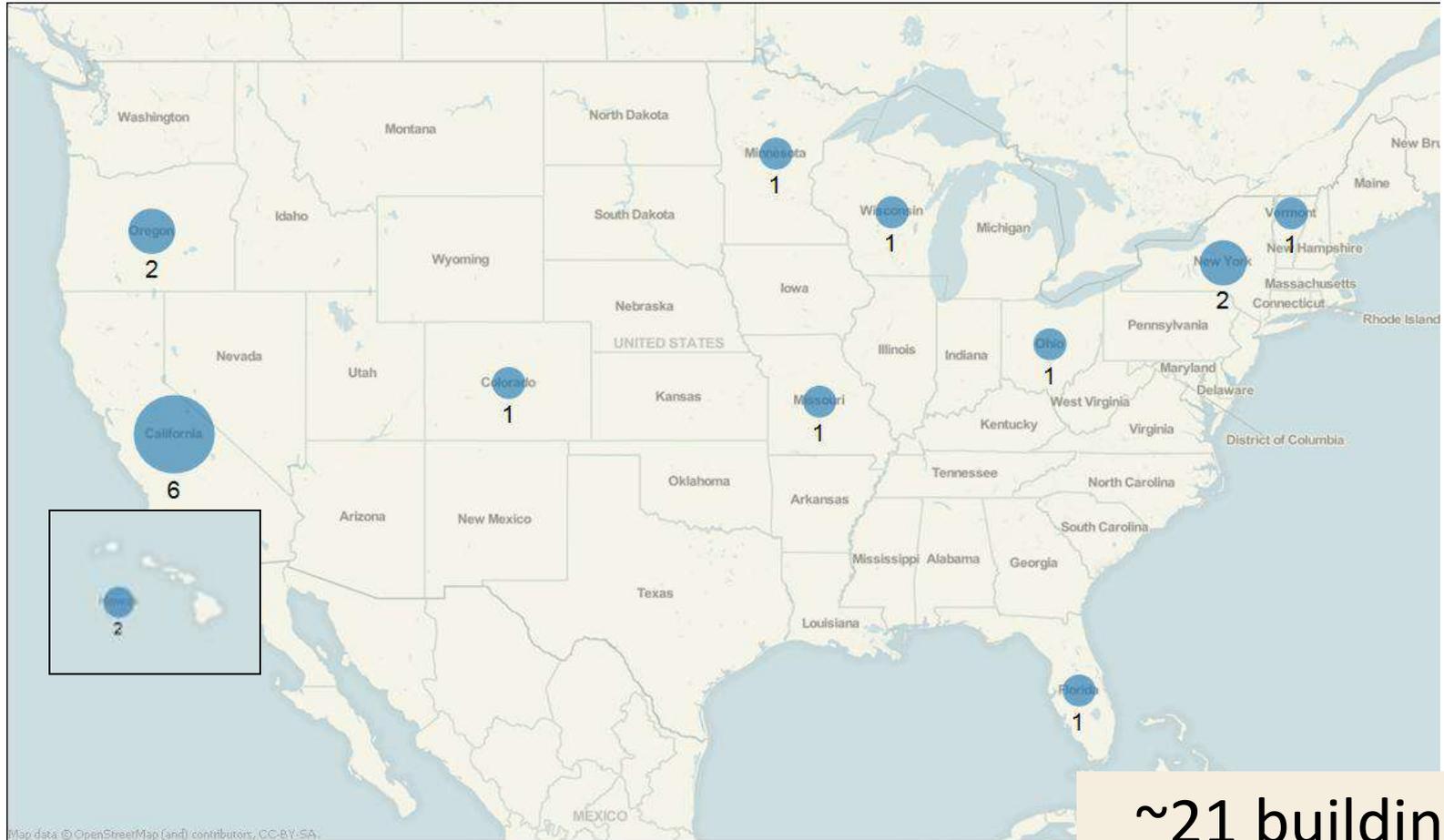
(111 Emerging + 29 actual)

Ultra-low Energy Buildings

ZNE-Efficient Buildings

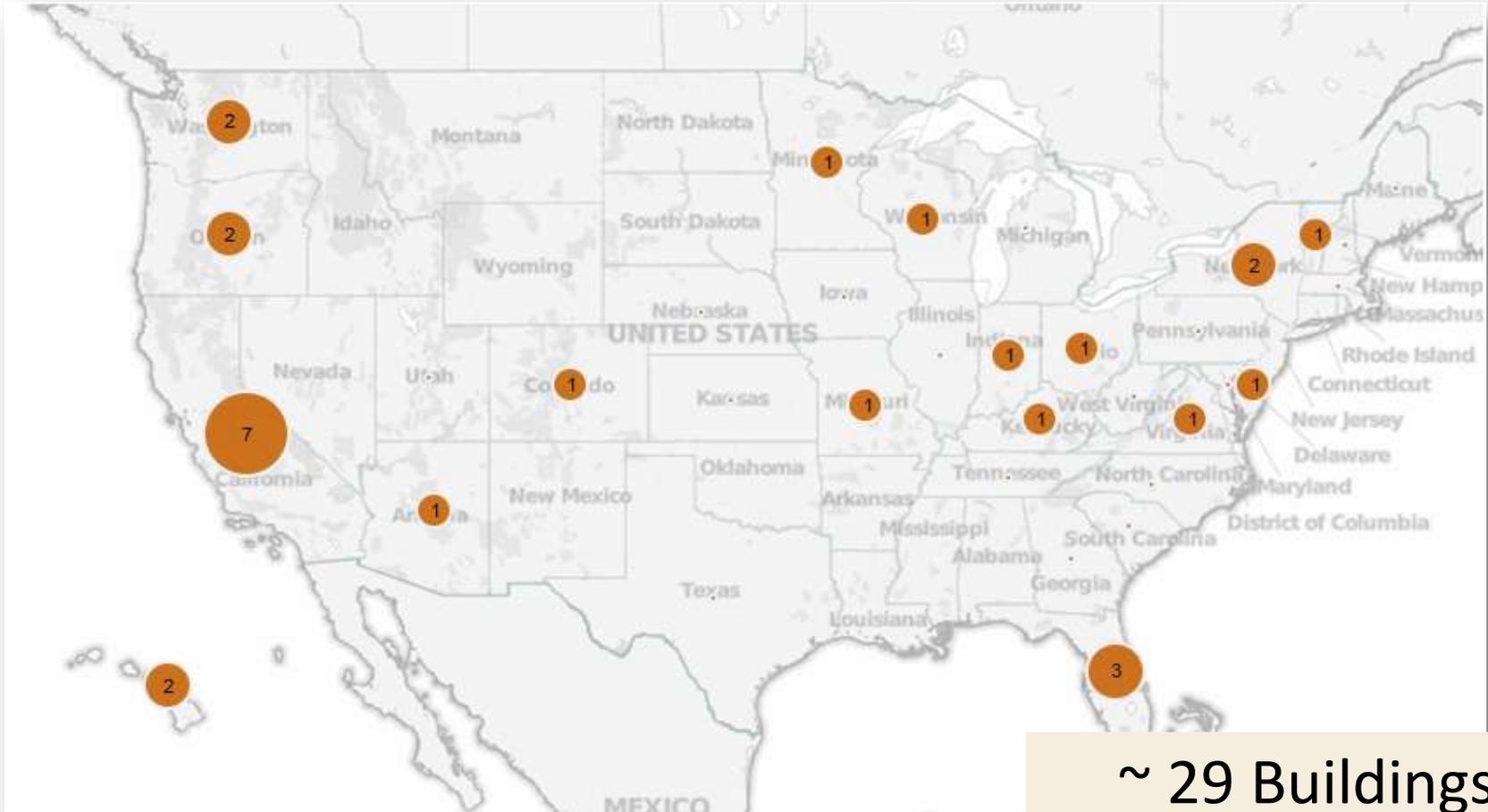
$n = 230+$

Locations: 2012 ZNE Buildings



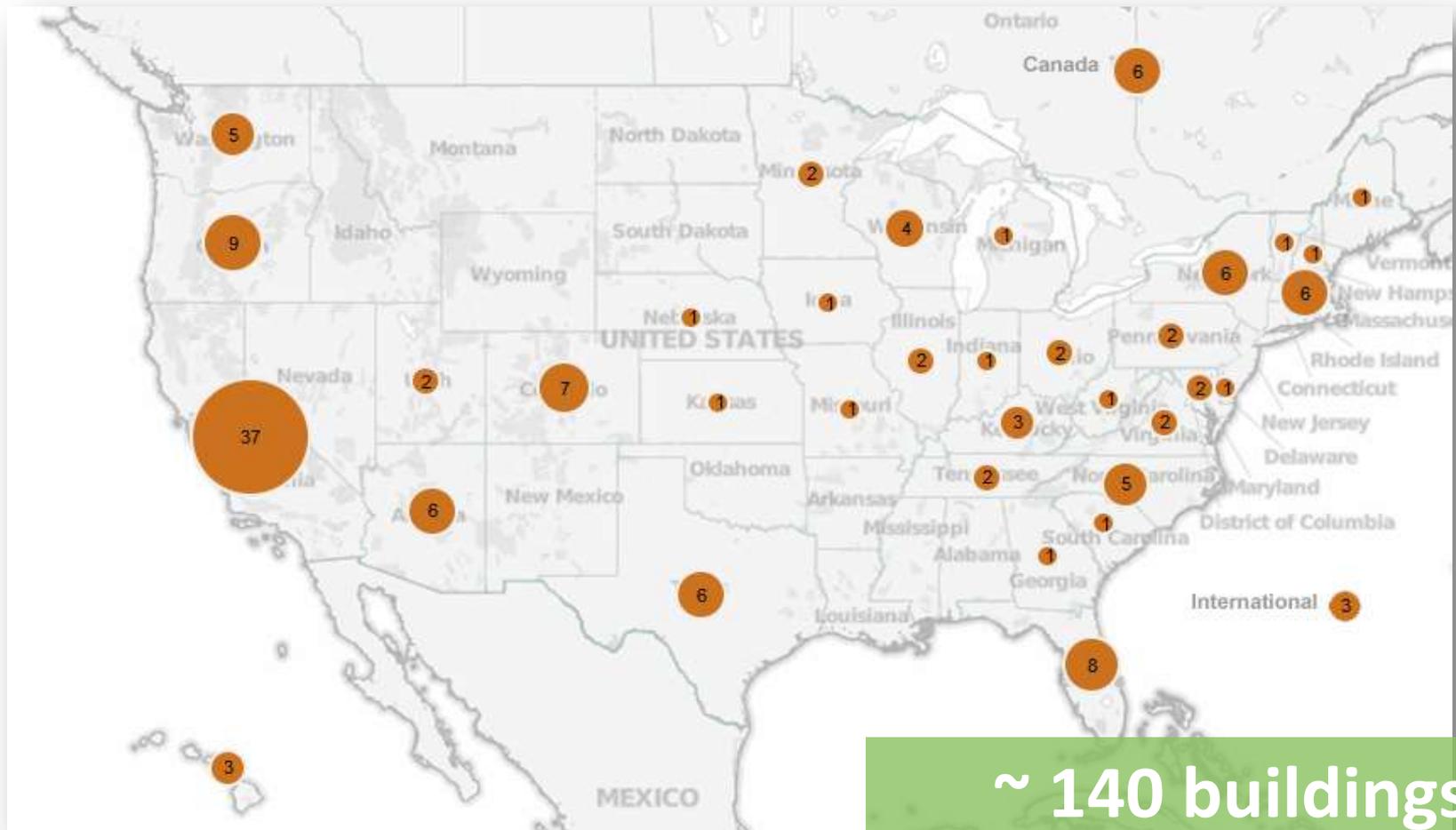
~21 buildings
in 11 states

Locations: 2013 ZNE-Actual Buildings



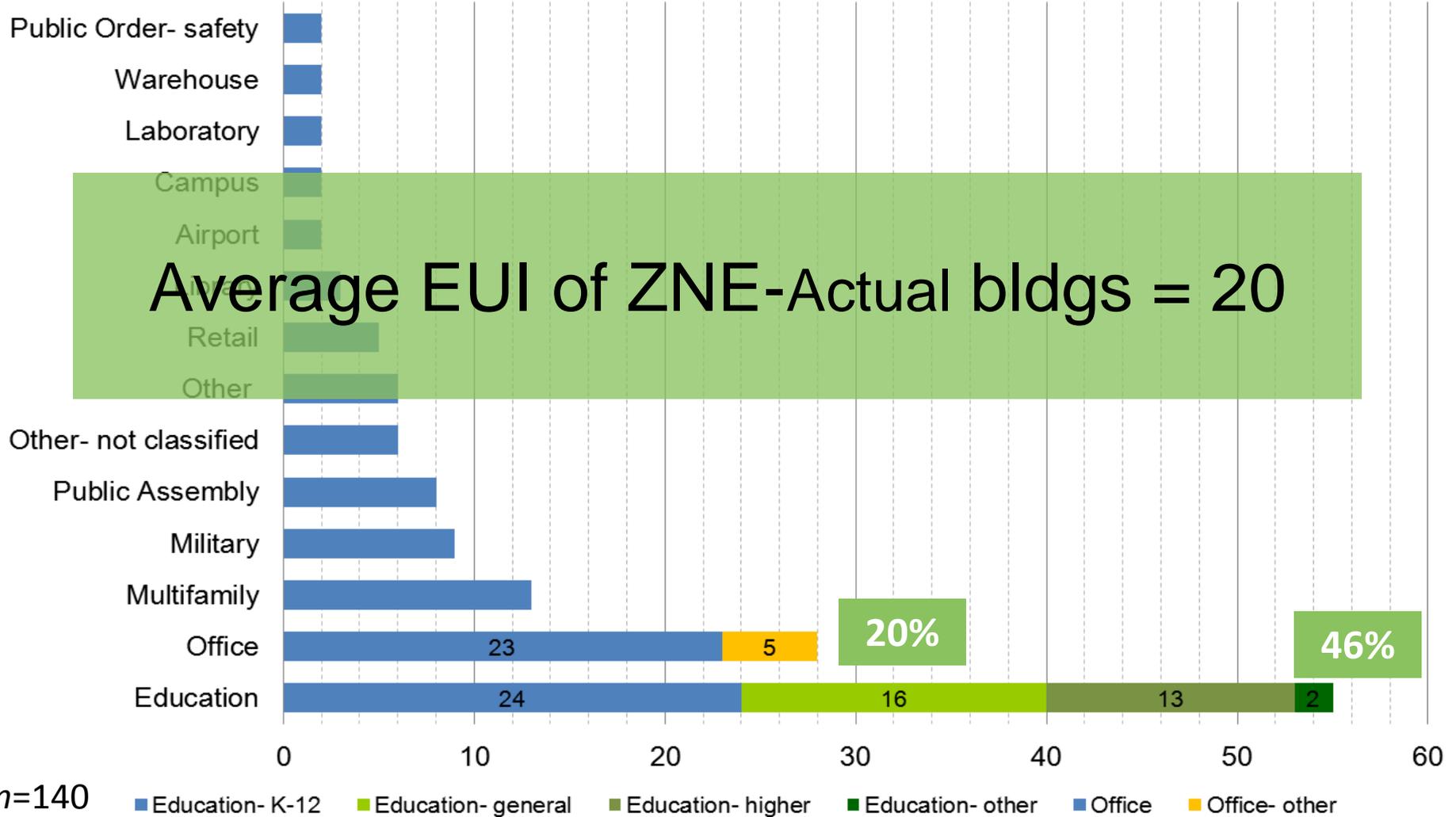
~ 29 Buildings
in 17 states

Locations: 2013 ZNE Buildings



~ 140 buildings
in 36 states!

ZNE Actual & Emerging Buildings by Type



ZNE Buildings by Size*

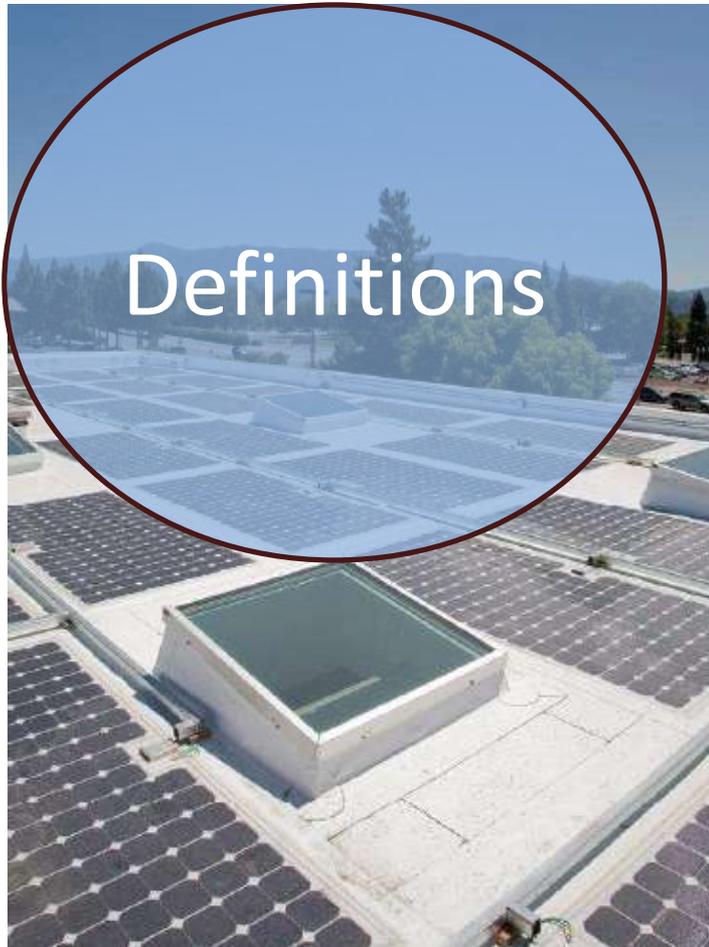


*Floorspace is not yet identified for all emerging projects. This graph $n=94$ buildings

Frequent ZNE Strategies

- Ground Source Heat Pumps
 - Ventilation: Natural, Dedicated Outdoor Air Systems (DOAS), Demand Control Ventilation (DCV)
 - Highly Efficient Thermal Envelope
 - Building Orientation & Glazing ratio
 - Solar Controls - shading
 - Daylighting Controls
 - Energy Management System
 - Building Dashboards
 - Radiant Heating / Cooling
 - Plug load Reductions
-

Challenges



- Data Gathering
- PV delayed due to cost
- Projects not occupied or operated as modeled
- Getting the metering right
- Commissioning – new form of ZNE Cx
- **Fear of disclosure** - ZNE seen as an end-all

Insights

- ZNE offers a clear and **aspirational** target
- It is hard - **a process** not a static outcome
- **High performance first** – lower energy use lowers PV cost
- Growth and opportunities in repeatable buildings (**schools, banks, small offices**)
- **District**, community, campus level offer cost and scaling efficiencies
- Actual ZNE happens **downstream of design** - operational focus, tenant behavior focus

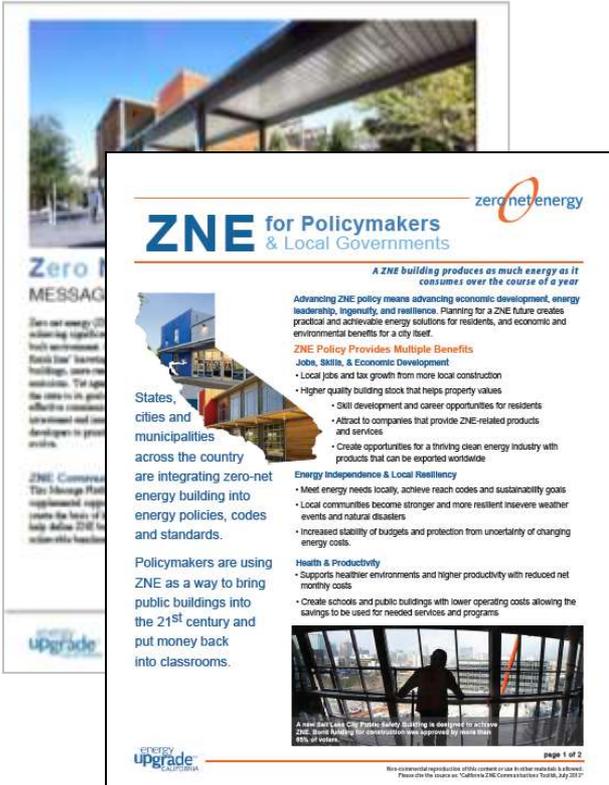
Trends

- Bigger buildings, more types, **more firms**, diverse climates, lower EUIs,
- Buildings use **readily available** technologies and integrated design
- **Net Positive**
- Designers and owners want **measurement and feedback**
- Design teams going beyond the project **to policy**
- Low-rise **Multifamily** growing
- **Ultra-low energy** accomplishments are accelerating

Ramona Apartments, Portland, OR

Resources:

ZNE CA Communications Toolkit



ZNE for Policymakers & Local Governments

A ZNE building produces as much energy as it consumes over the course of a year

Advancing ZNE policy means advancing economic development, energy leadership, ingenuity, and resilience. Planning for a ZNE future creates practical and achievable energy solutions for residents, and economic and environmental benefits for a city fleet.

ZNE Policy Provides Multiple Benefits

- Jobs, Skills, & Economic Development
- Local jobs and tax growth from more local construction
- Higher quality building stock that helps property values
- Skill development and career opportunities for residents
- Attract to companies that provide ZNE-related products and services
- Create opportunities for a thriving clean energy industry with products that can be exported worldwide

Energy Independence & Local Resiliency

- Meet energy needs locally, achieve reach codes and sustainability goals
- Local communities become stronger and more resilient to severe weather events and natural disasters
- Increased stability of budgets and protection from uncertainty of changing energy costs.

Health & Productivity

- Supports healthier environments and higher productivity with reduced net monthly costs
- Create schools and public buildings with lower operating costs allowing the savings to be used for needed services and programs

States, cities and municipalities across the country are integrating zero-net energy building into energy policies, codes and standards.

Policymakers are using ZNE as a way to bring public buildings into the 21st century and put money back into classrooms.

ENERGY upgrade

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Getting to ZNE

1 DESIGN PROCESS
Addressing systems through integrated design.

2 TECHNICAL
Addressing systems through integrated design.

Why Should Building Owners Go ZNE?

When committing to a high efficiency building, ZNE is the best business decision and adds the most value.

- Reduce
- Leverage
- Decrease
- Contribute

Leading by Example
Steven H. Collins

- Former solo repair shop turned architect's office
- 1st commercial only in CA to achieve ZNE usage
- Monitoring system tracks the actual use of building systems, and real world data for educating others.
- All electrical systems designed to reduce energy loads by over 62,000 kWh per year
- Remaining energy is offset by renewable electrical and water heating energy located on the roof top

Sample Presentation



ZNE Architecture & Engineering

A ZNE building produces as much energy as it consumes over the course of a year

ZNE Frequently Asked Questions

A ZNE building produces as much energy as it consumes over the course of a year

11 What is a ZNE building? A ZNE building is a building that produces as much energy as it consumes over the course of a year. This is done through high efficiency building systems, renewable energy, and energy storage.

12 Why is a ZNE building important? ZNE buildings are important because they reduce energy costs, improve indoor air quality, and reduce greenhouse gas emissions.

13 How is a ZNE building achieved? A ZNE building is achieved through a combination of high efficiency building systems, renewable energy, and energy storage.

14 What are the benefits of a ZNE building? ZNE buildings offer many benefits, including reduced energy costs, improved indoor air quality, and reduced greenhouse gas emissions.

15 How can I find a ZNE building? You can find a ZNE building by searching for "ZNE building" in a search engine or by contacting a ZNE building professional.

Fact Sheets

Message Platform & ZNE for Policymakers



Questions and Polling

Portland, Oregon

www.newbuildings.org

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9/17/2013 © NBI

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A new Salt Lake City Public Safety Building is designed to achieve ZNE. Bond funding for construction was approved by more than 85% of voters.

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Policy Polling