

Why ZNE Schools?

not?! Reverse the argument/conversation - Start from ground up with educating students
t ZNE + sustainability - Set an example for ZNE/Env. Leadership - Current path is
ustainable - Need a more financially sustainable route - Also spreading the message to sch
ader community - Healthier buildings (e.g., daylighting, or relating to higher test scores) -
ools can be resilient resource centers - Wise use of public funds - Increased savings in
ations, brings more money for programs - Showing students what is possible - Demonstra
schools play a part in meeting state and city goals - Demonstrating good stewardship and
ing a positive legacy for future generations - Students are good advocates with parents -
er occupied buildings have best payback over long term - Not an unlimited amount of ener
on footprint - Next generation of leaders - Energy savings goes back to programs - Manda
oming - Next step after LEED - Cost savings - School district as model for community - As
ling type, it is ideal - low occupancy, sufficient land, owner-occupied - Greenhouse gas
ctions and climate goals - Fiscally responsible with taxpayer dollars - Better financing term
cation next generation of leaders - Better financing terms - Education next generation of
ers - Increased population, increased need for more schools, will be more cost-effective to
l now - Learning/teaching benefits: daylighting enhances student performance and wellbei
hilia (connection to nature) - Easier to operate - Maintenance - Energy savings - Retention
s - School as teaching tool - Save planet one building at a time - Necessity - Electricity is
ensive - Reinvest savings for other programs - Set a good example for kids - see us doing
monstrate leadership - Technology creates a better, more convenient building - Attract and
n students and faculty - Quantitative benefits - Integrate into curriculum - Building awarene
with them whole lives - Change expectations of students - We are doing our part - Better t
es and health



National Status of ZNE and ZNE Schools

[Link to table of contents.](#)

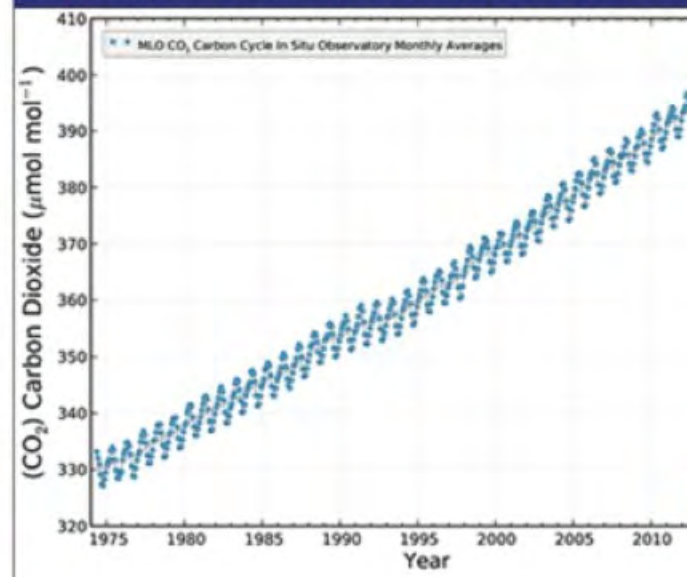
ANCE: n's CO2 levels have crossed the 400 ppm threshold for good

y Patterson, E&E reporter

ed: Thursday, September 29, 2016



CO2 measurements from Mauna Loa Observatory



[+] Carbon dioxide measurements taken at the National Oceanic and Atmospheric Administration's Mauna Loa Observatory show that average CO2 concentrations have not fallen below 400 ppm in 2016. September is traditionally when CO2 concentrations are lowest in the annual carbon cycle, but data this year show levels remaining above the 400 ppm threshold. Graph courtesy of NOAA.

C40
CITIES

ARUP

Potential for Climate Action

Cities are just getting started

December 2015



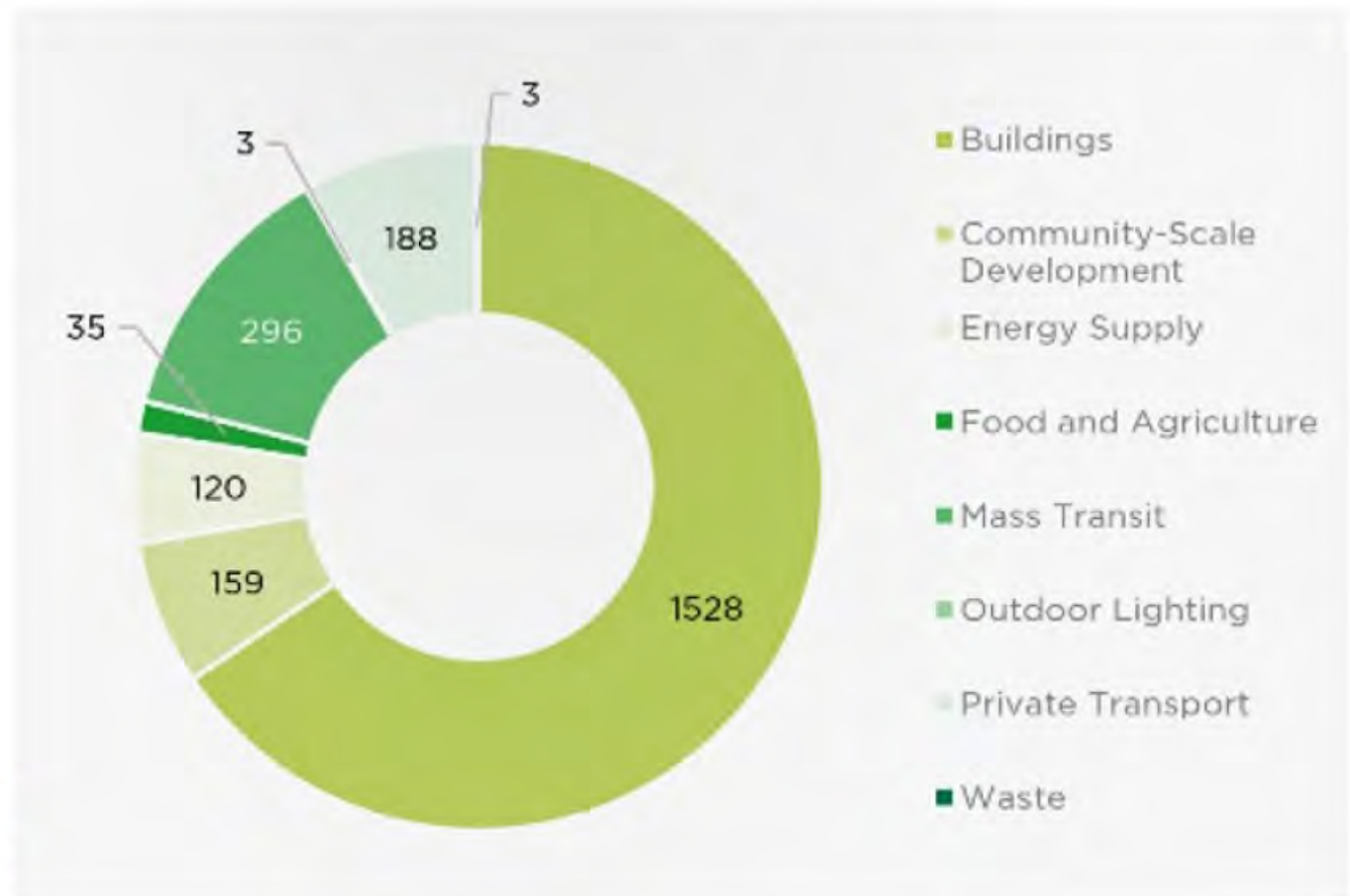
http://publications.arup.com/Publications/P/Potential_for_Climate_Action.s

New Buildings Institut

40/Arup: Potential for Climate Action

● **450 MtCO₂e**
could be saved by 2020
if the highest priority
actions were implemented.

Figure 2.04. Sector breakdown of first priority actions.

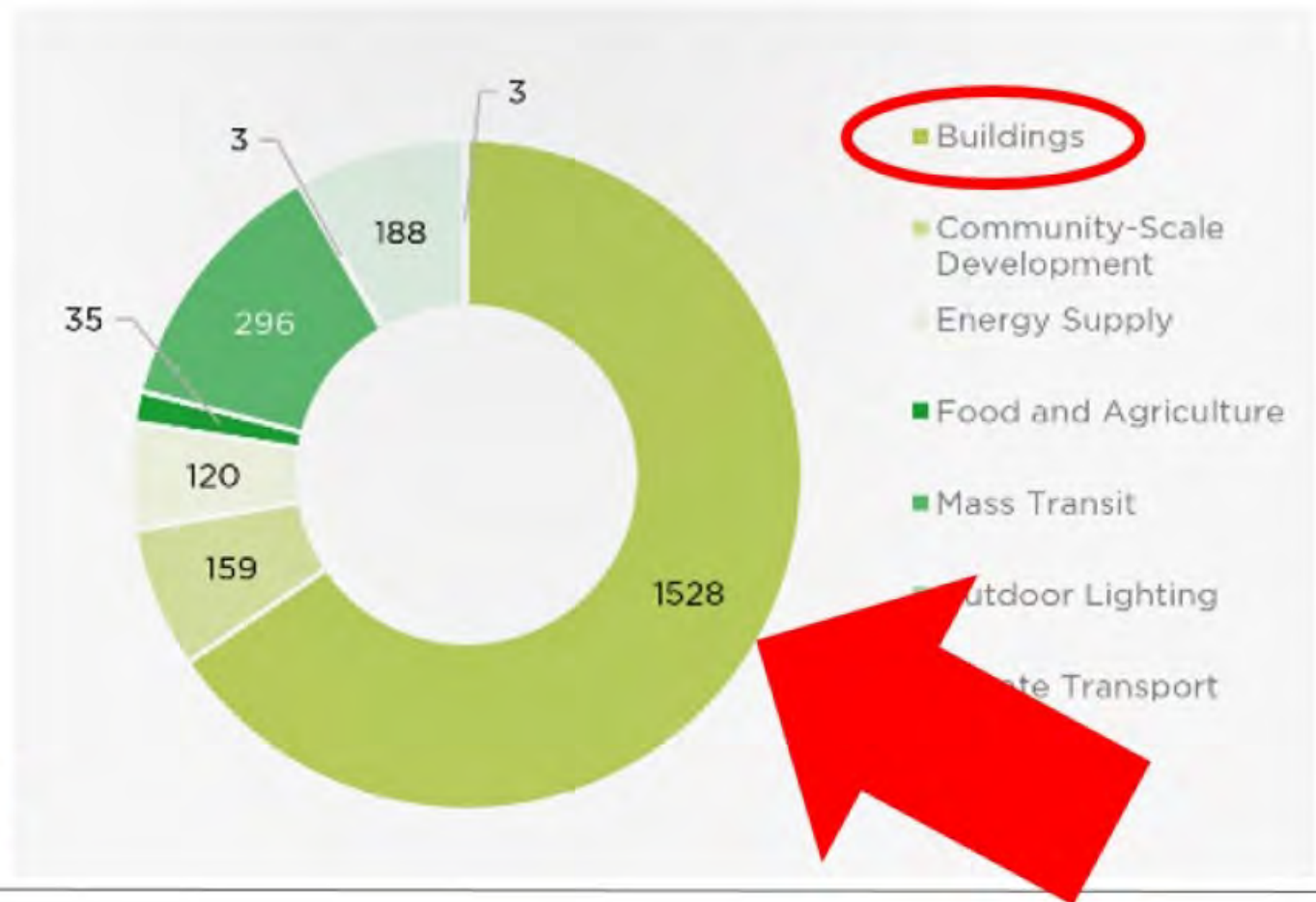


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Figure 2.04. Sector breakdown of first priority actions.



publications.arup.com/Publications/P/P/potential_for_Climate_Action.aspx

GETTING TO zero

BUILDINGS DATABASE

Buildings Institute is proud to introduce
Getting to Zero Buildings Database.





The largest database on ZNE buildings in North America and the only database searchable by ZNE Status & Energy Performance

<http://newbuildings.org/getting-to-zero-buildings-database>

Buildings
Institute

RESEARCH CODES & POLICY TOOLS & GUIDES EVENTS NEWS BLC
ZERO NET ENERGY ADVANCED BUILDINGS OUTCOME-BASED

Project Name	City	State/Province	Area (ft ²)	Net EUI (kBtu/ft ² /yr)*
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 Doyle Conservation Center (DCC)	Leominster	MA		
 Capitol Area East End, Block 225: California Department of Education Headquarters	Sacramento	CA		
 Melink Corporation Headquarters	Milford	OH		
 Redding School of the Arts	Redding	CA		

nbi new buildings
institute

RESEARCH CODES & POLICY TOOLS & GUIDES EVENTS NEWS BLOG ABOUT NBI DONATE
ZERO NET ENERGY ADVANCED BUILDINGS OUTCOME-BASED PERFORMANCE DEE

GETTING TO ZERO DATABASE

Online Tool / December 19, 2015 / Outcome-Based Performance, Zero Net Energy

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. Find more answers to questions in the [Getting to Zero Building Database and Registry FAQ](#). The Getting to Zero Project Portal is an access point to the DOE's [High Performance Buildings Database](#).

Do you have a low energy project you would like to share? Find out what qualifies, and submit through our online registry.

SHARE A PROJECT

Search

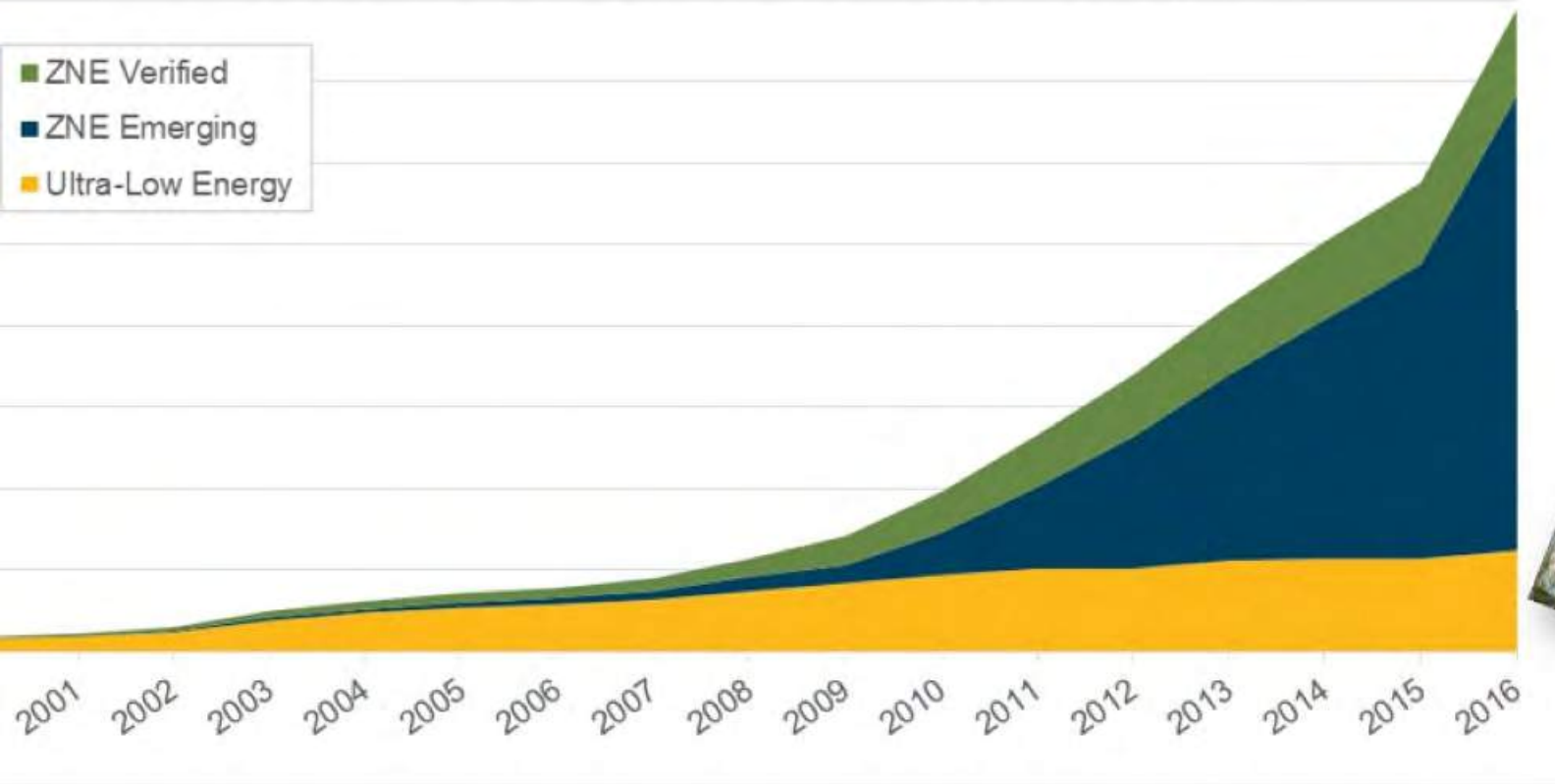
Our Work

- Zero Net Energy
- Advanced Building
- Outcome-Based
- Deep Energy Ret

You May Also Be

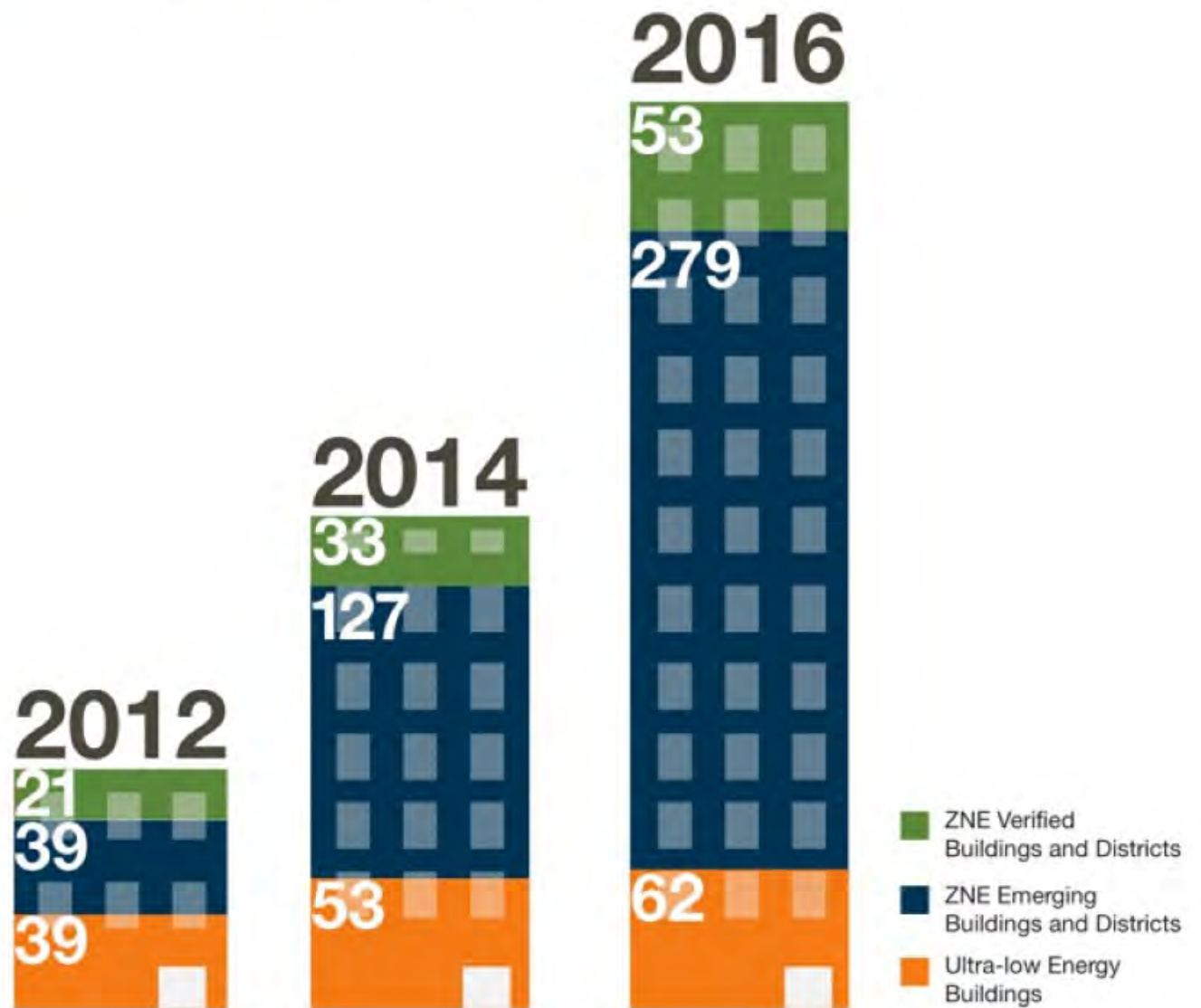
Growth in ZNE Buildings

Growth of ZNE and Ultra-Low Energy Buildings

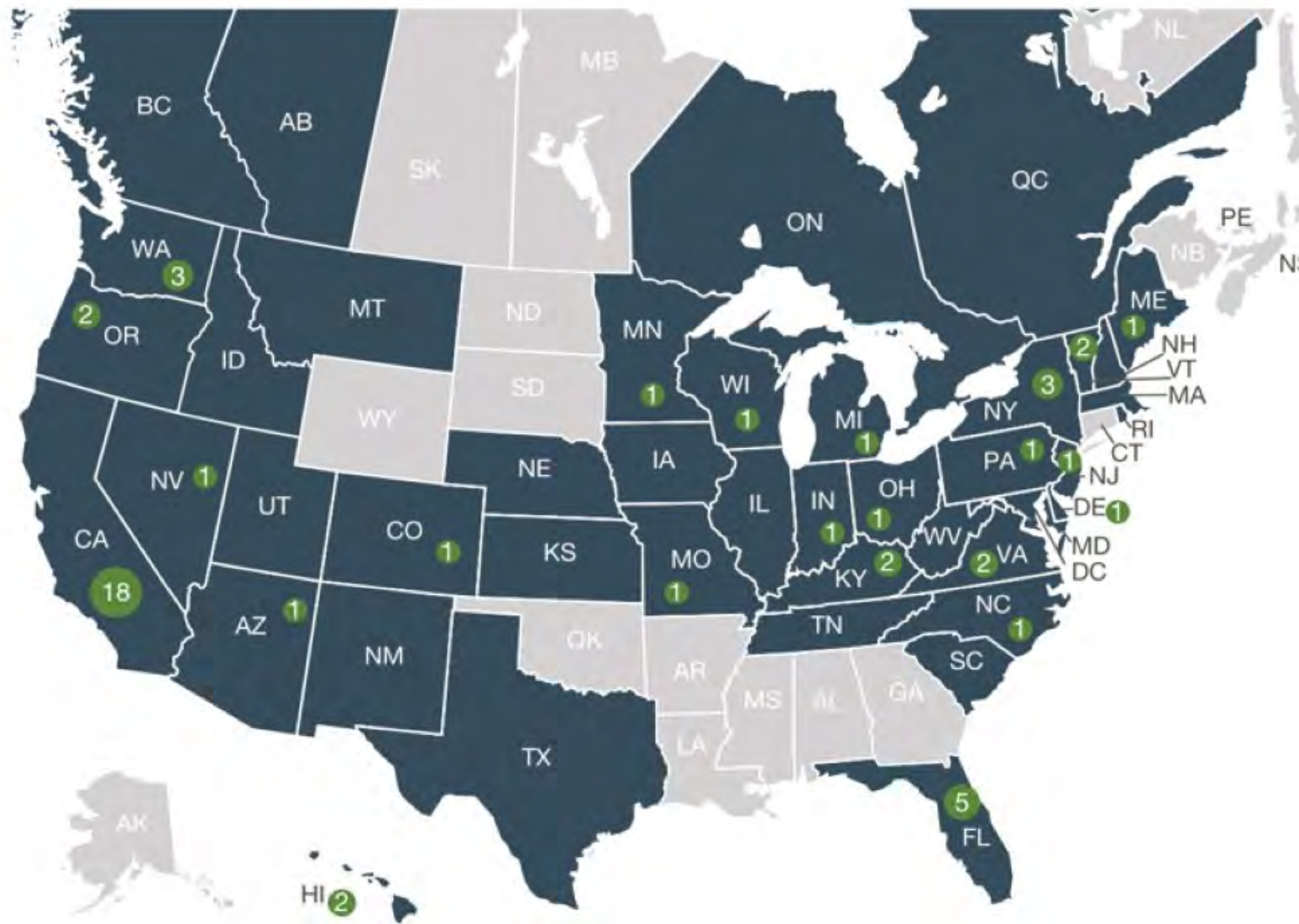


ZNE is Gaining Momentum

Number of ZNE Projects



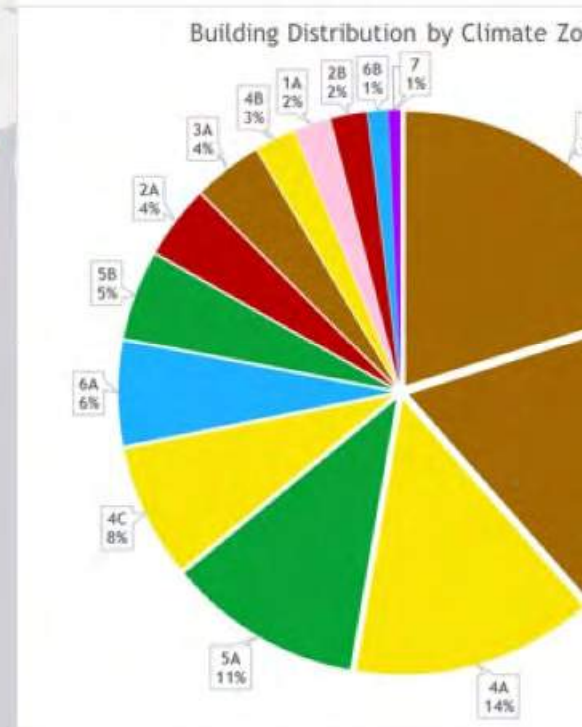
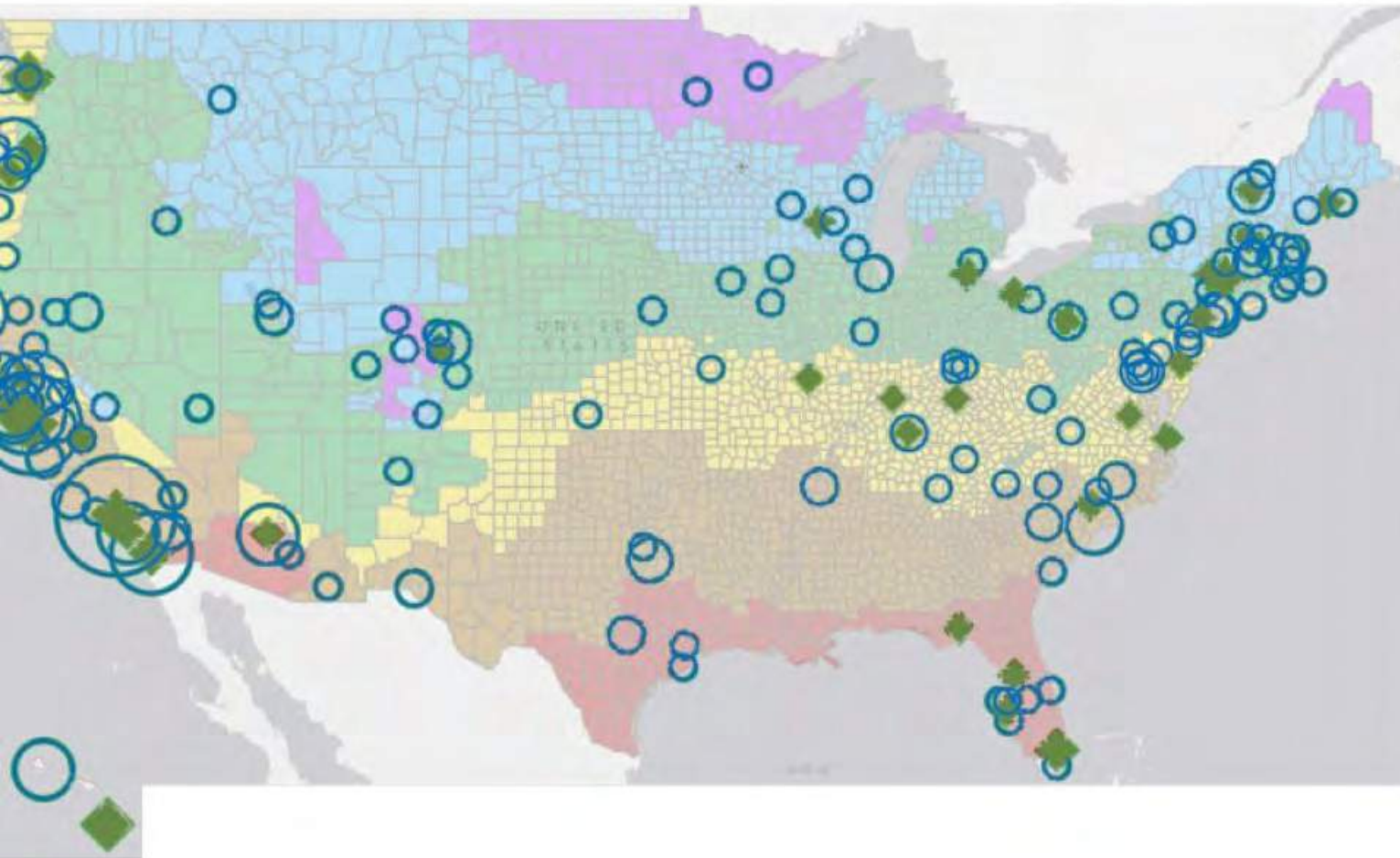
Where are ZNE Projects?



Number of ZNE Verified Buildings

States and Provinces with ZNE Emerging or Verified Buildings (44)

NEW Buildings in Every Climate Zone



ZNE and Ultra-Low Buildings are Possible in Many Building Types Across the US



**Small-Med Commercial
Offices**



K-12 Schools



Large Office Facilities



Environmental Centers



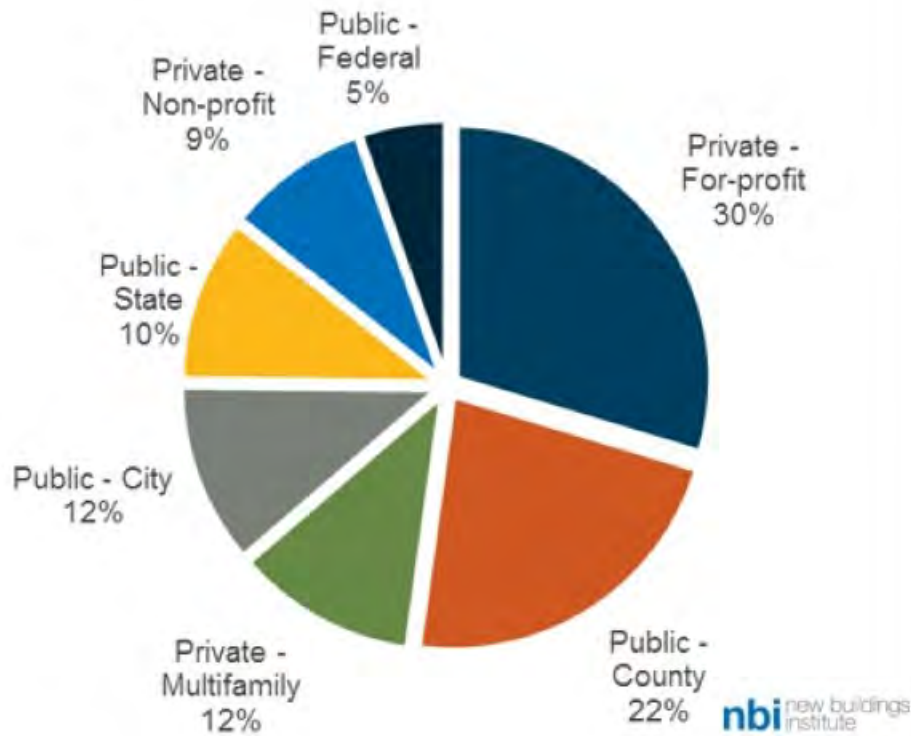
**Higher Education
Institutions**



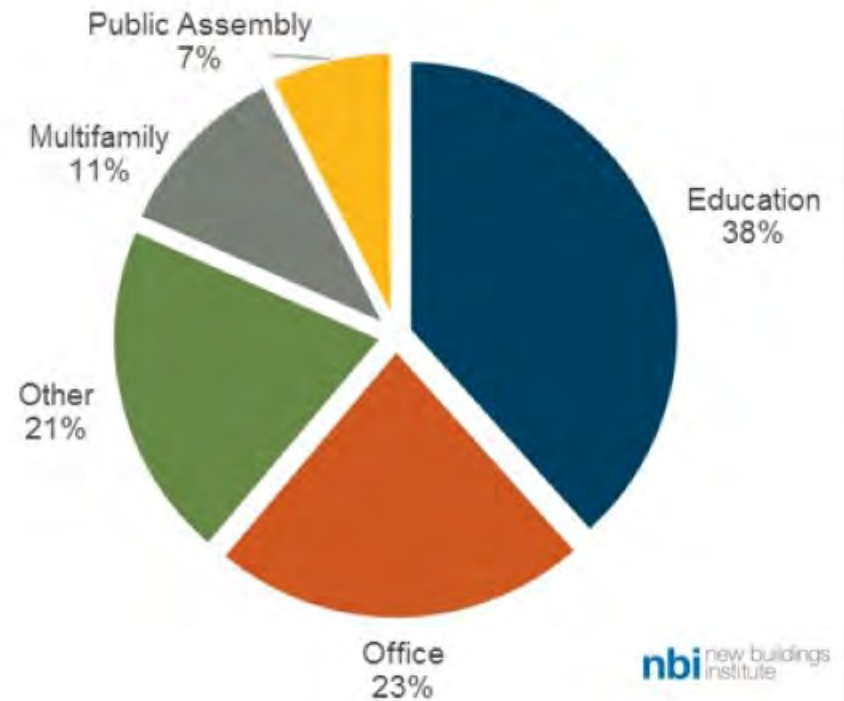
Government Offices

Who is Aiming for ZNE?

ZNE Building Ownership Type

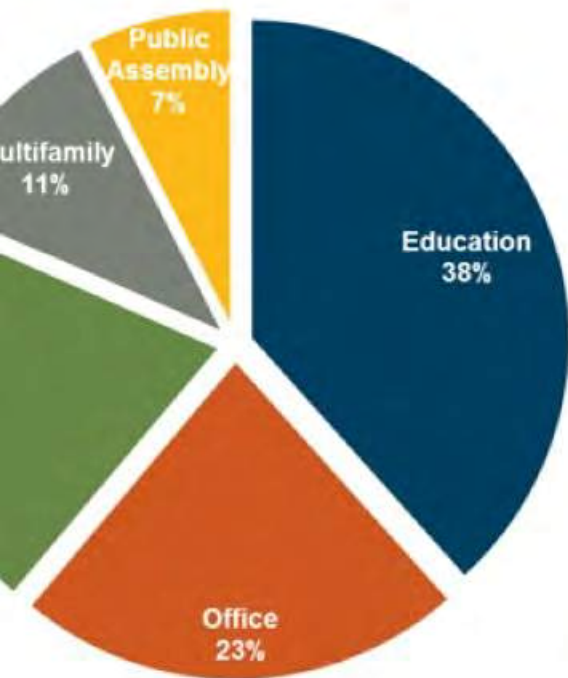


ZNE and Ultra-Low Energy Building Types

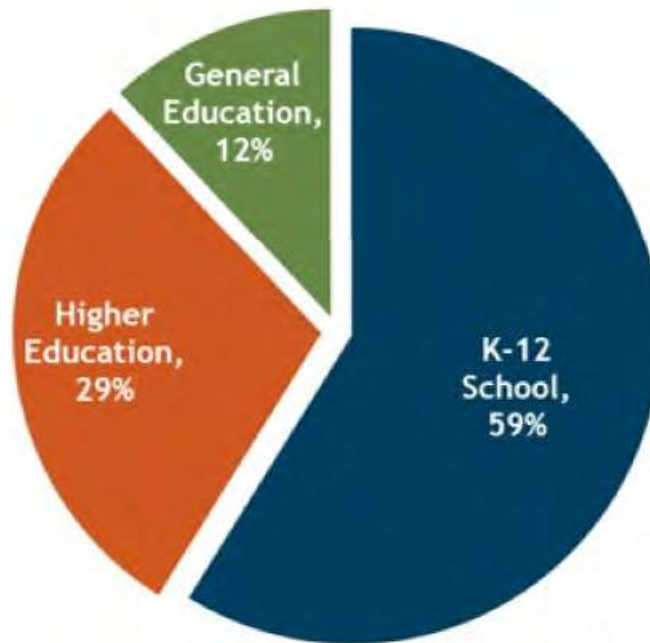


Schools are Leading

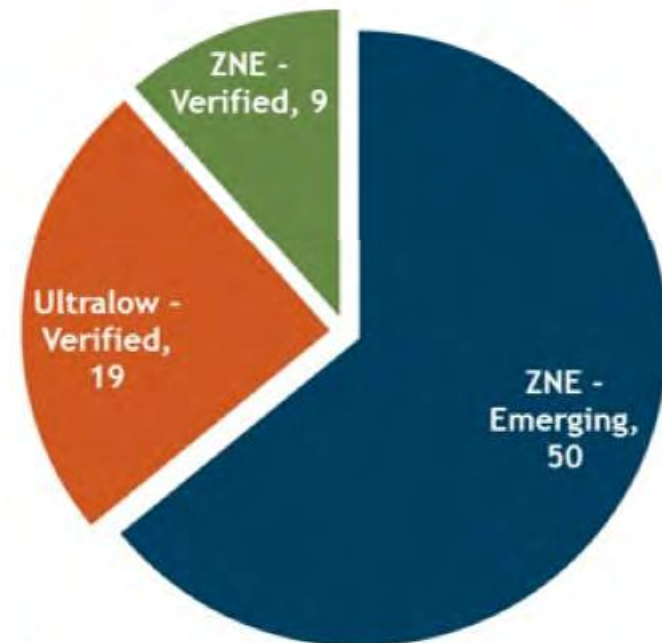
and Ultra-low Energy Building Types



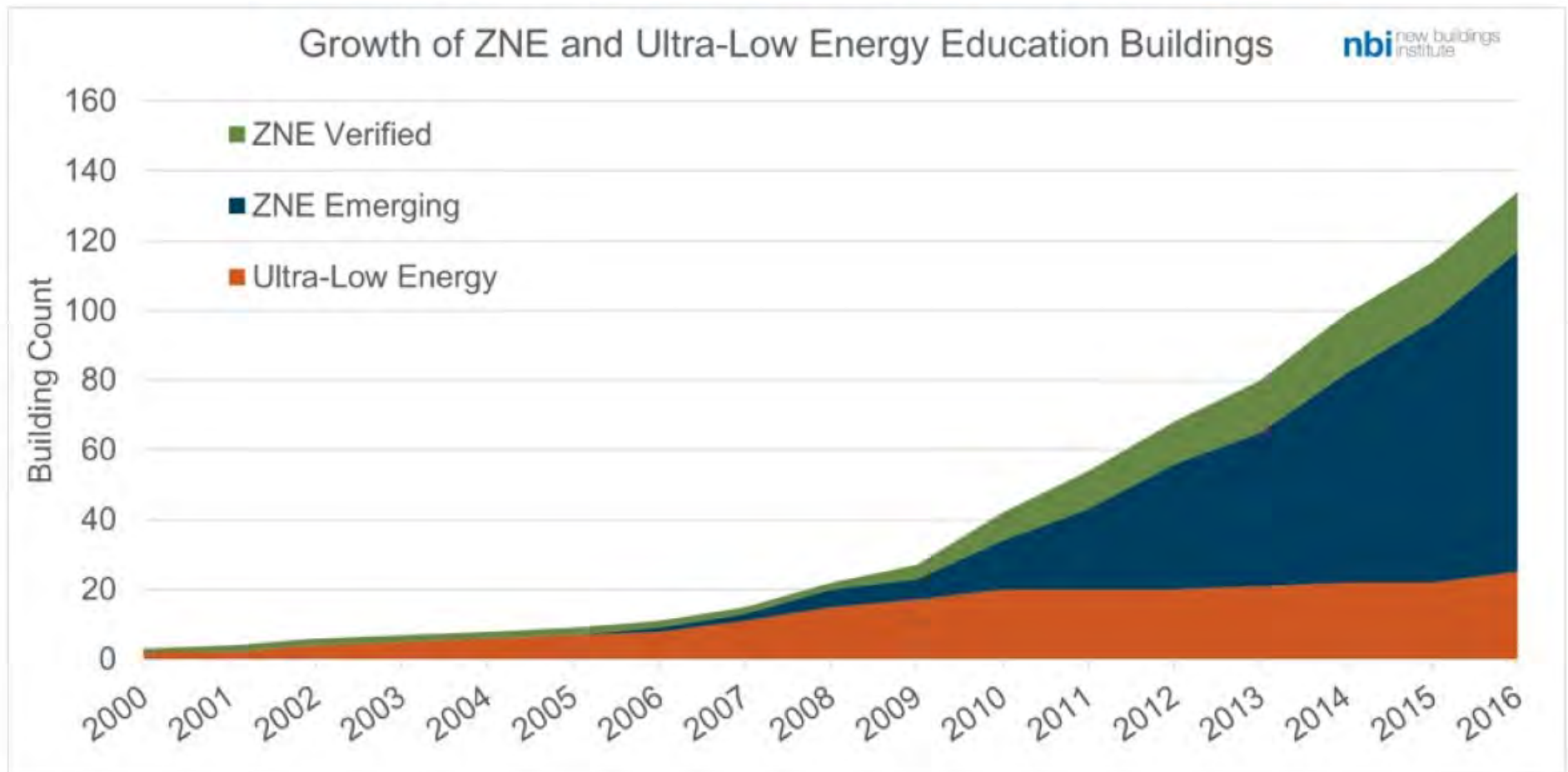
Breakdown of Education Building Types



K-12 School Building Count



Growth in ZNE and Ultra-Low Energy Education Buildings



ZNE Schools: Top Five States

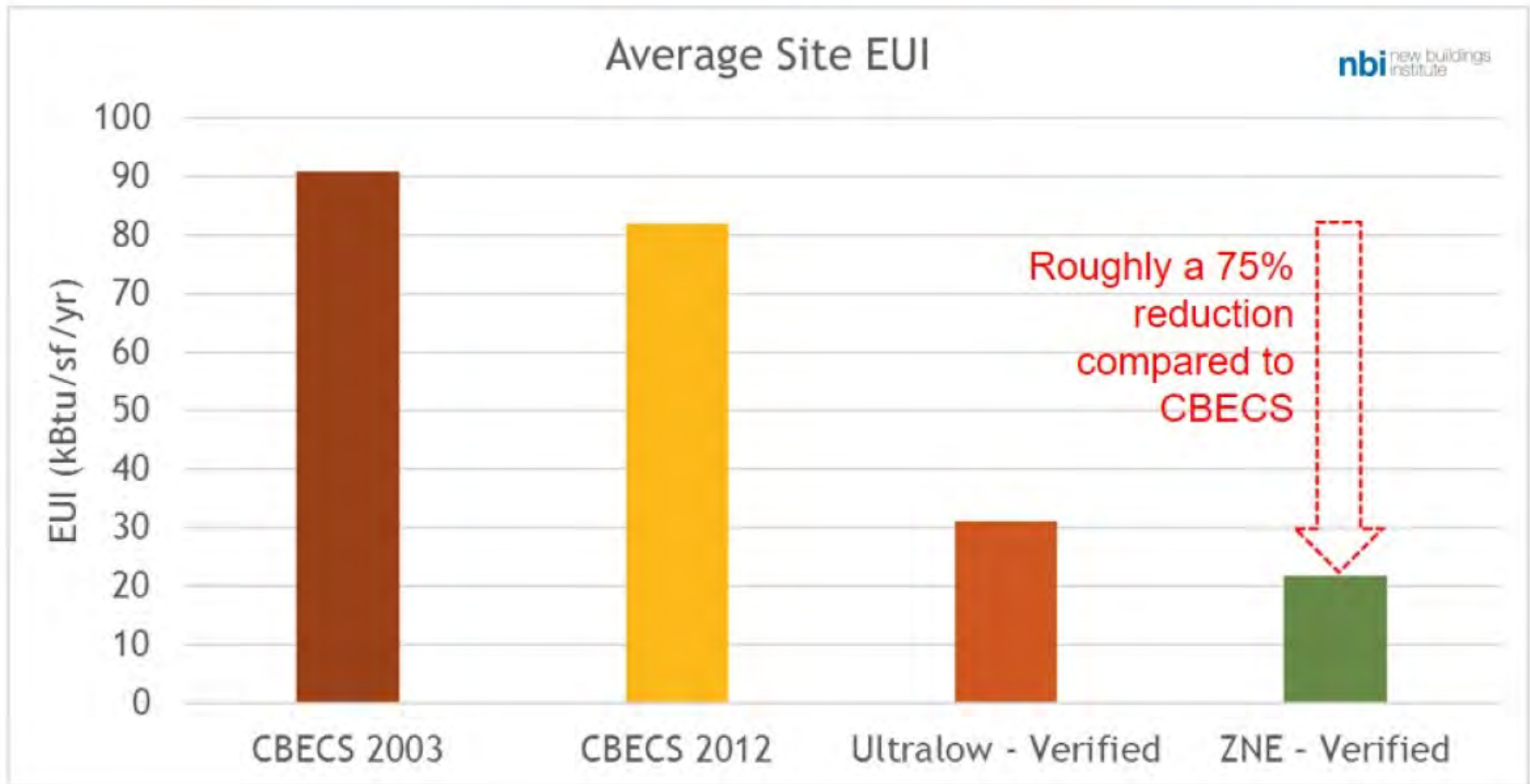
State	ZNE Verified	ZNE Emerging	Ultra-Low Energy Verified	Grand Total
CA	2	19	6	27
KY	2	3	4	9
NC	1	4	2	7
TX	0	5	1	6
SC	0	5	0	5
Total	10	51	19	80

ZNE Schools: Northeast

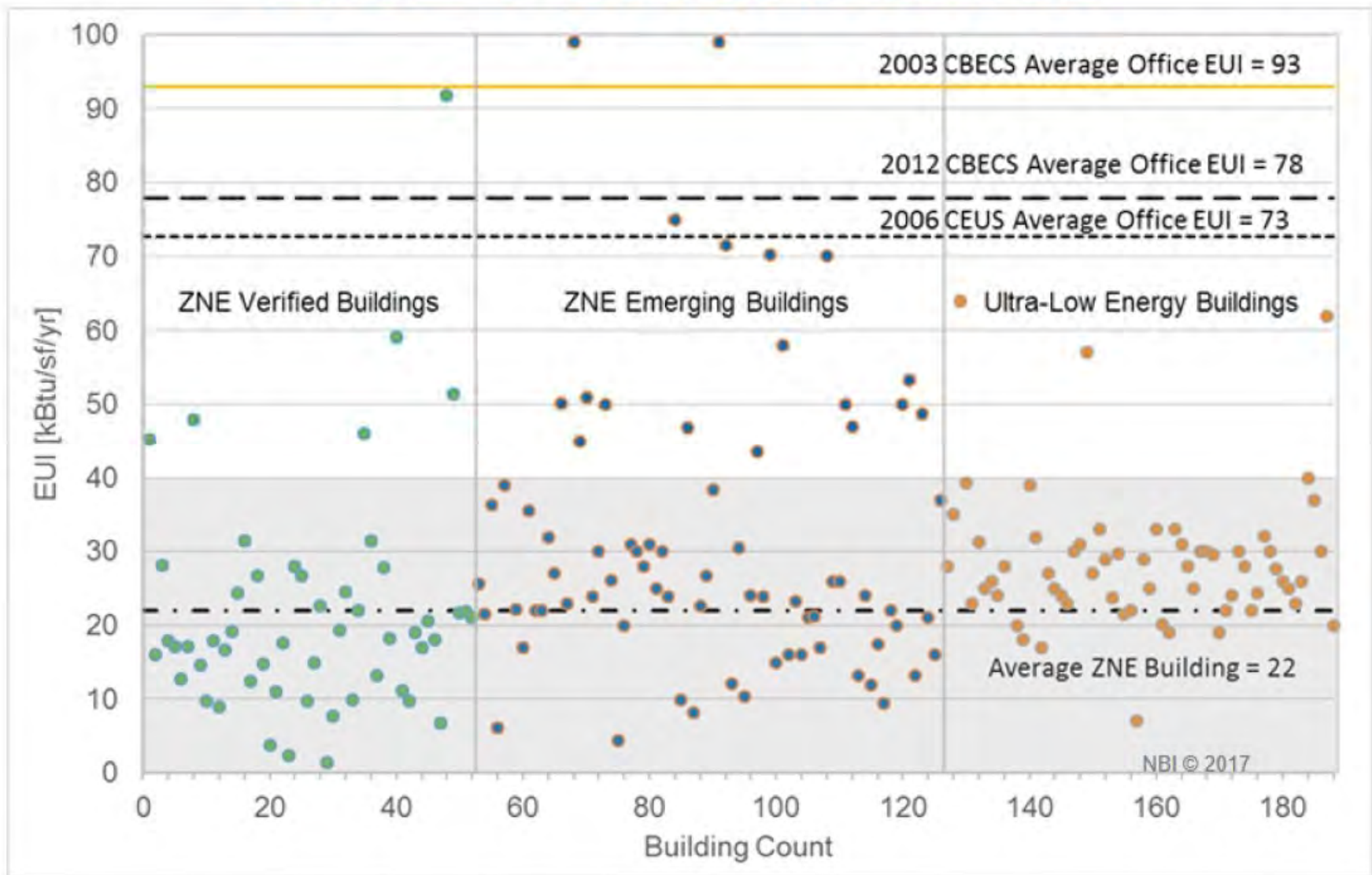
Name	ZNE Status	Completion year	State	City	Gross Area (sq. ft)
Cambridge MA - MLK School	ZNE - Emerging	2015	MA	Cambridge	140,000
Bay MET School	ZNE - Emerging	2014	RI	Newport	16,800
Walds School of Portland	ZNE - Emerging	2015	ME	Cumberland Foreside	15,000
PS2 (Kathleen Grimm School of Leadership and Sustainability)	ZNE - Emerging	2015	NY	Staten Island	68,680
Key Field House	ZNE - Verified	2009	VT	Putney	16,800
Law School	ZNE - Verified	2014	NJ	Gladstone	20,000

For more information on projects, have a look at our 2016 list as well. <http://newbuildings.org/2016-list-zero-net-energy-buildings>

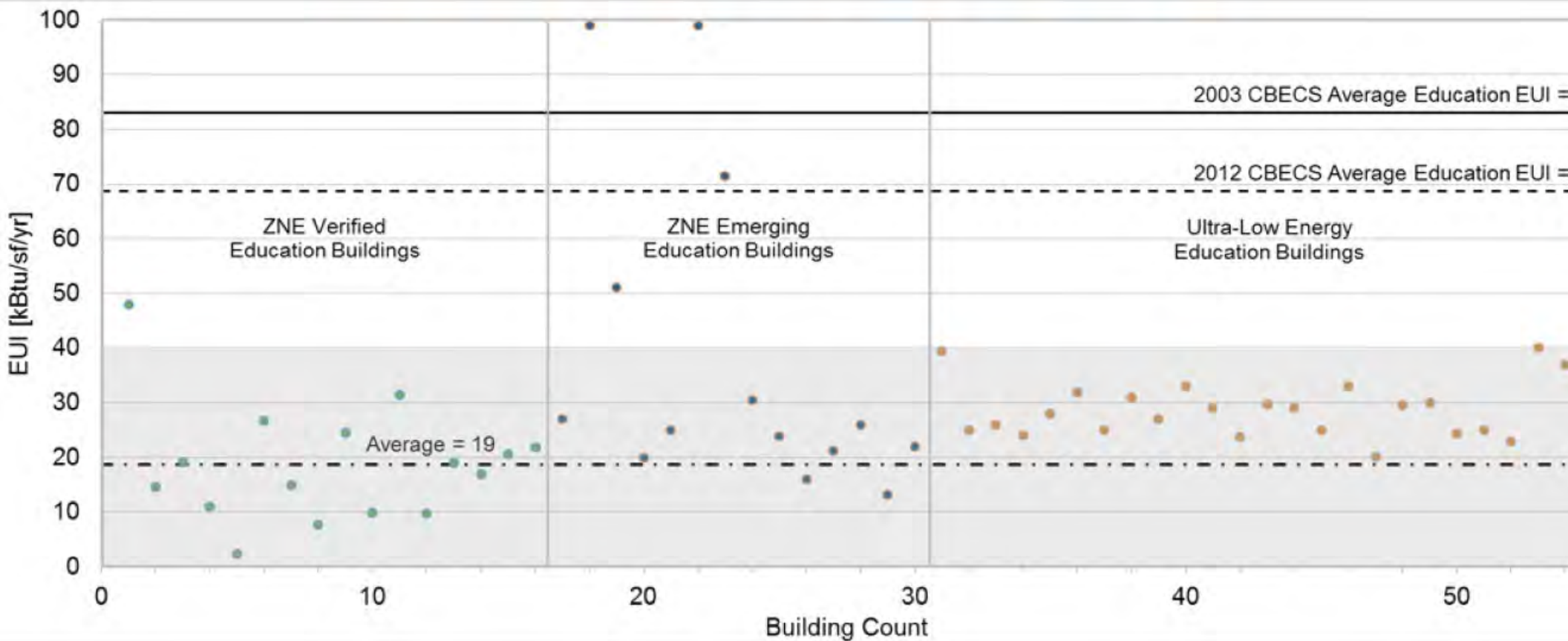
Significant Savings Potential



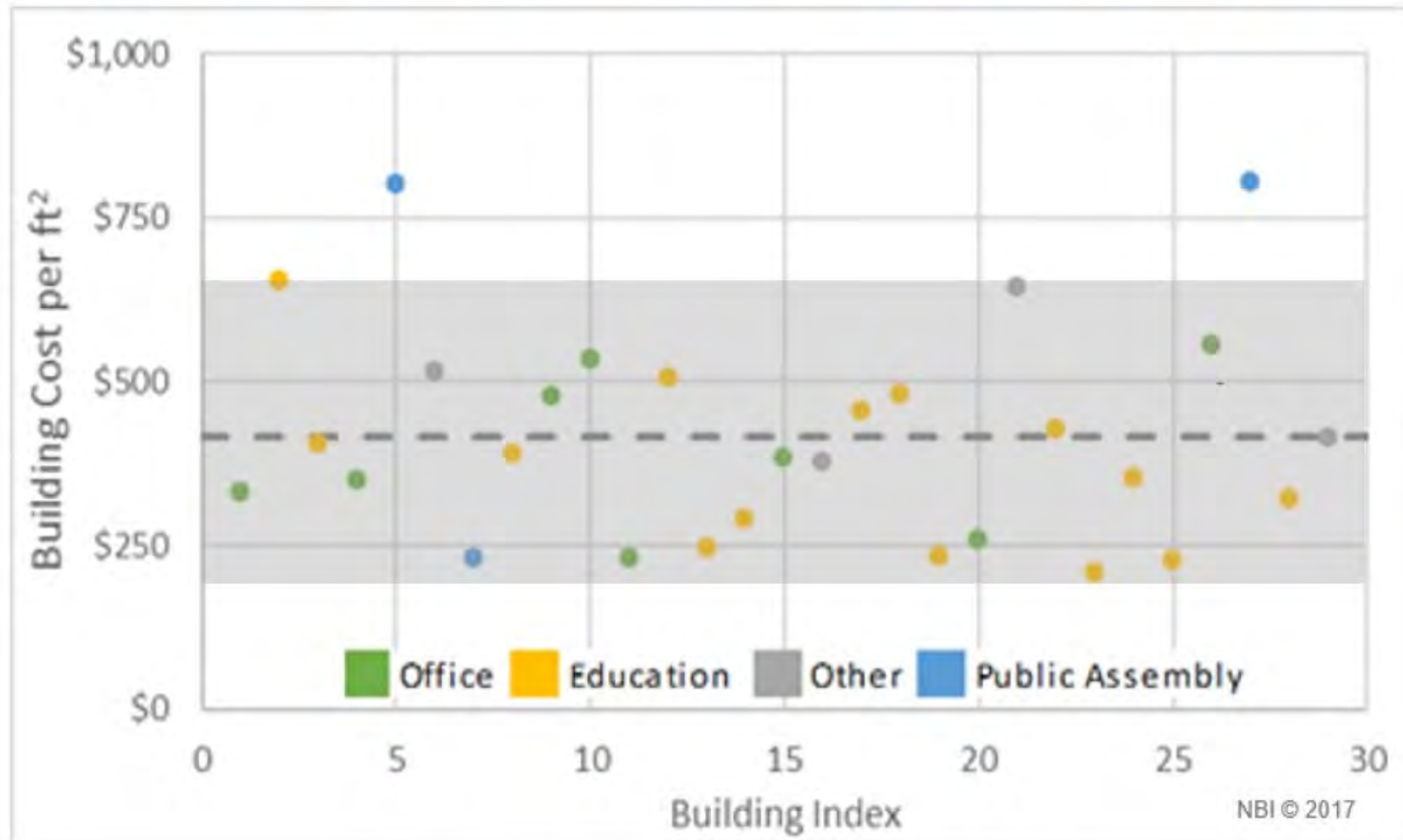
ZNE Performance



Gross EUI Performance Ranges: Education Buildings



Costs of ZNE Buildings



Total Building Cost for select ZNE Verified Buildings (n=29)

Common Technologies for Ultra-low Energy

Building Orientation & Glazing ratio

Highly Efficient Thermal Envelope

Ventilation: Natural, Dedicated Outdoor Air Systems (DOAS), Demand Control Ventilation (DCV)

Daylighting Access and Controls

Solar Control - shading

Energy Recovery Systems

Peak Load Reductions

Radiant Heating / Cooling & Chilled Beams

Energy Management Systems

Building Dashboards

Ground Source Heat Pumps



Redding School for the Arts,
Courtesy : Trilogy Architecture Steve Whittaker Photograph

How are Schools Getting to Zero?

Strategies:

Setting **ZNE Goals**, passing **Resolutions** and developing **Policies**

ZNE planning with **Stakeholder engagement** and **communication** of ZNE practices

Piloting ZNE projects in new and existing buildings and classrooms

Capital improvement projects - Look at pipeline

Existing building renewal - Major renovation to ZNE

District-wide and Campus-wide ZNE approaches – getting ZNE to scale



Regional Overview

- NEEP's Zero Energy Buildings Roadmap – Progress Report
- Various Benchmarking Ordinances have been Enacted
 - Boston, Cambridge, Portland, South Portland (ME) and Montgomery County (MD)
- Leaders throughout the region:
 - DC
 - Massachusetts
 - New York
 - Rhode Island
 - Vermont

