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: Policies and Programs

February 26, 2014

David Hewitt

Director of Strategic Partnerships

nbi new buildings institute

Thank You to Our Sponsors!

Today's Topics

- Why is supporting ZNE important?
- Options for effective ZNE related policies and programs at the state and local level.
- Examples of policies in action and their impact.


La Valentina North Townhomes Sacramento, CA

Speakers

- **Jim Edelson – Policy Director, NBI**

  Broad ZNE policies and codes
- **Christopher Wagner – Program Manager, NASEO**

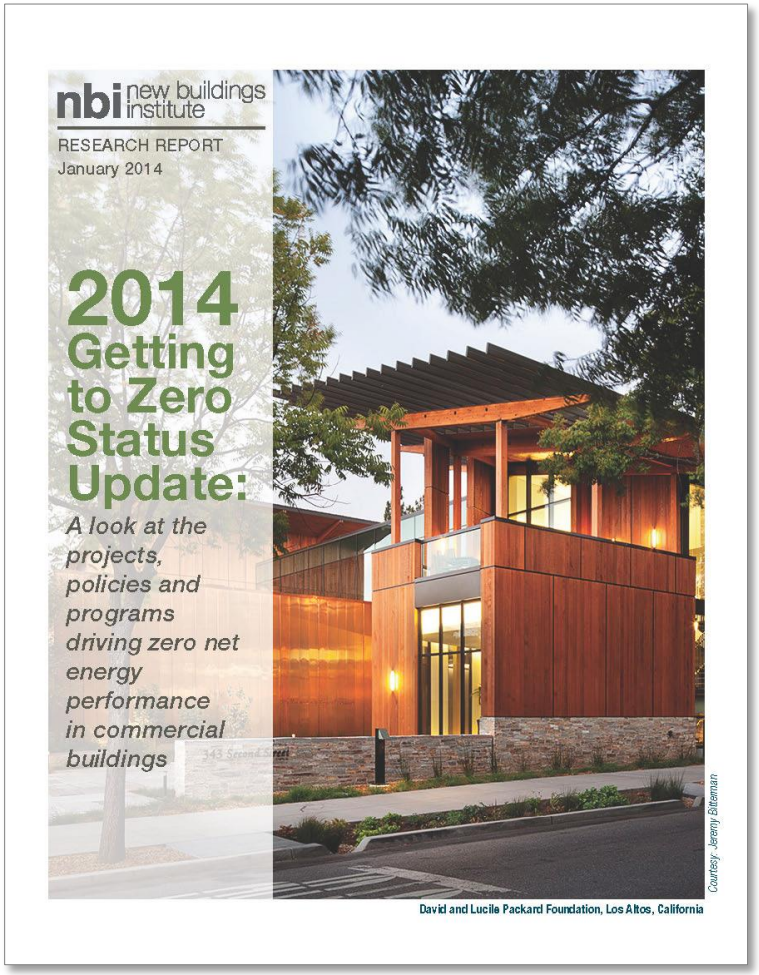
  Strategies to support market leadership
- **Janet Streff – Manager, Minn. Energy Office and Tom McDougall– President, The Weidt Group**

  One state's path, legislation through initial implementation

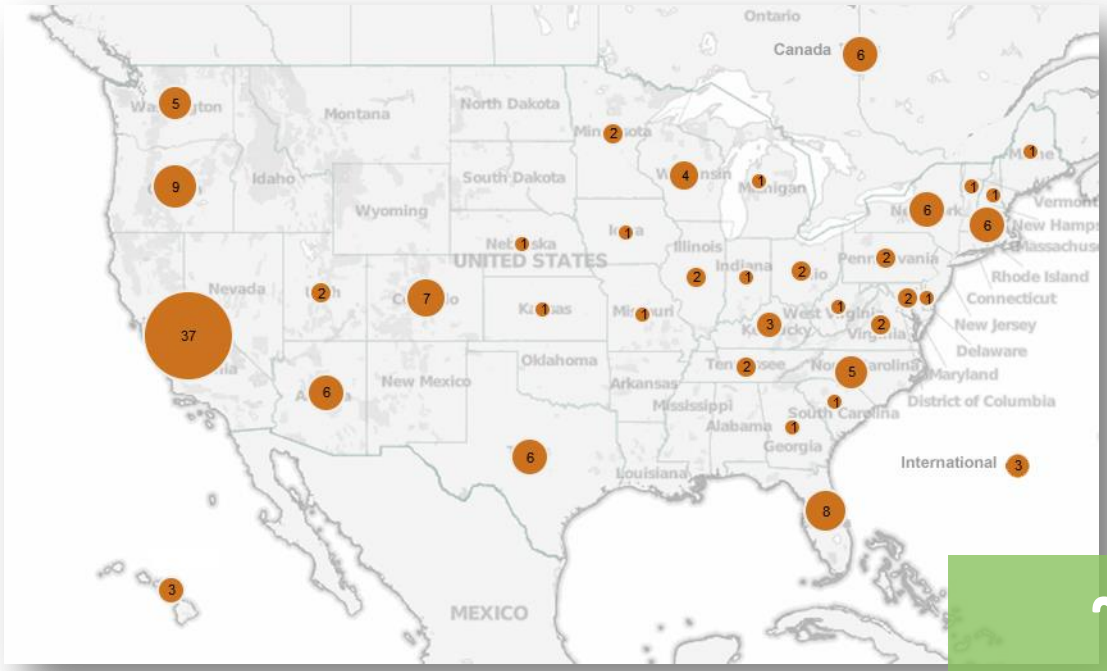
Q &A at the end – we may go long

Background

- Zero Net Energy Building - a building that generates onsite at least as much energy as it uses over the course of a year
- ZNE Buildings proven as a concept; clearly can be a major part of our buildings future
- Costs of PV dropping



Locations:
2014 ZNE Commercial Buildings



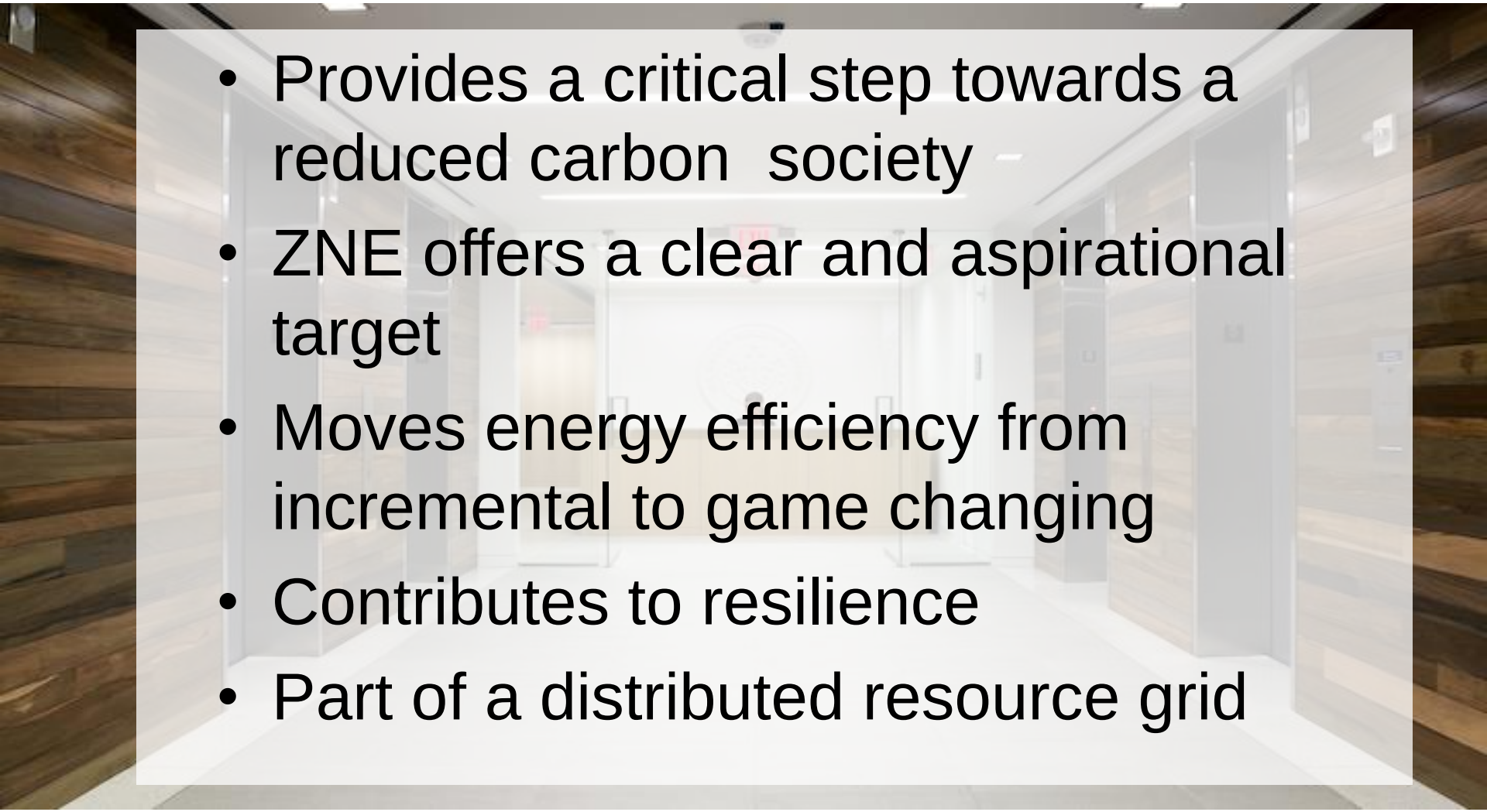
~ 160 buildings in 37 states!

ZNE; the beginning of a trend

	ZNE Commercial Buildings		Total ZNE
Yr	Actual	Emerging	
2012	21	39	60
2014	33	127	160

ZNE and Ultra-Low Energy Buildings have doubled in two years

Benefits



- Provides a critical step towards a reduced carbon society
- ZNE offers a clear and aspirational target
- Moves energy efficiency from incremental to game changing
- Contributes to resilience
- Part of a distributed resource grid

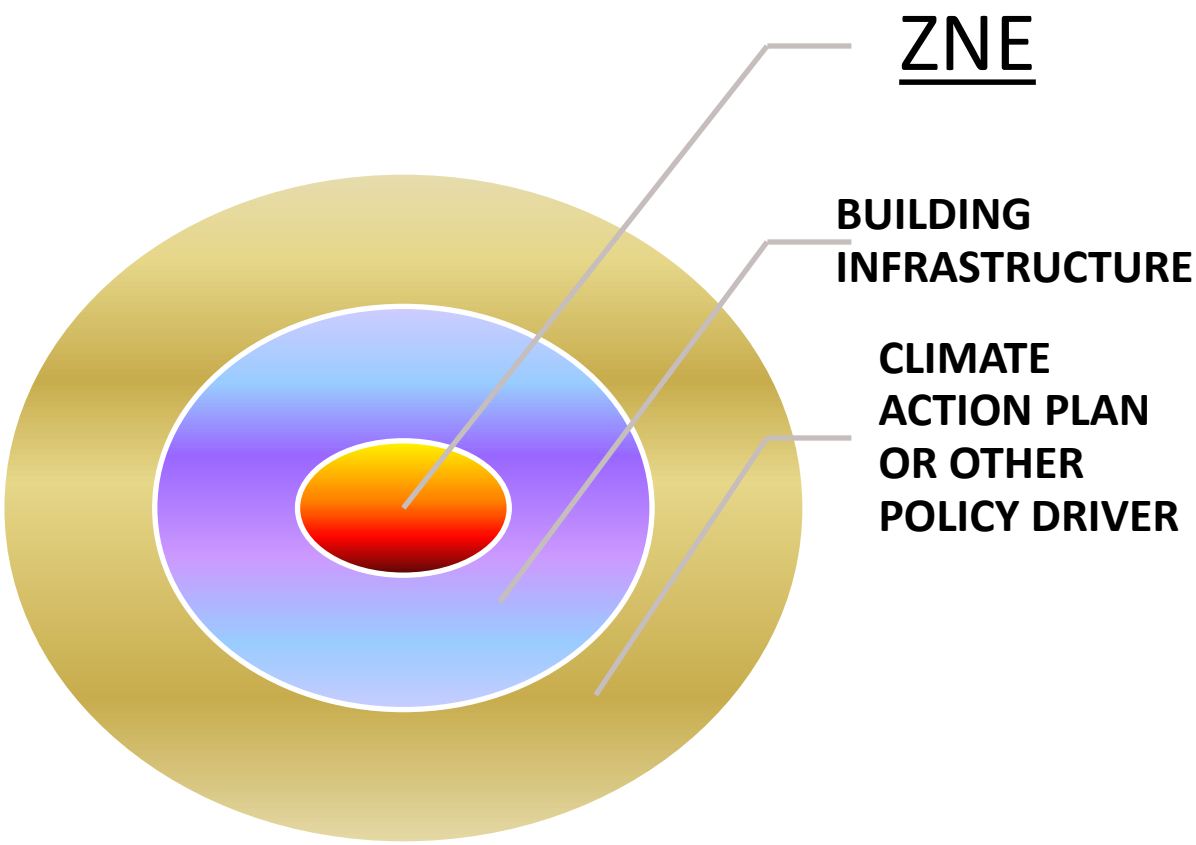
nbi new buildings institute

ZNE Building Policy Update

“a journey of a thousand miles begins with a single step”
Lao Tzu

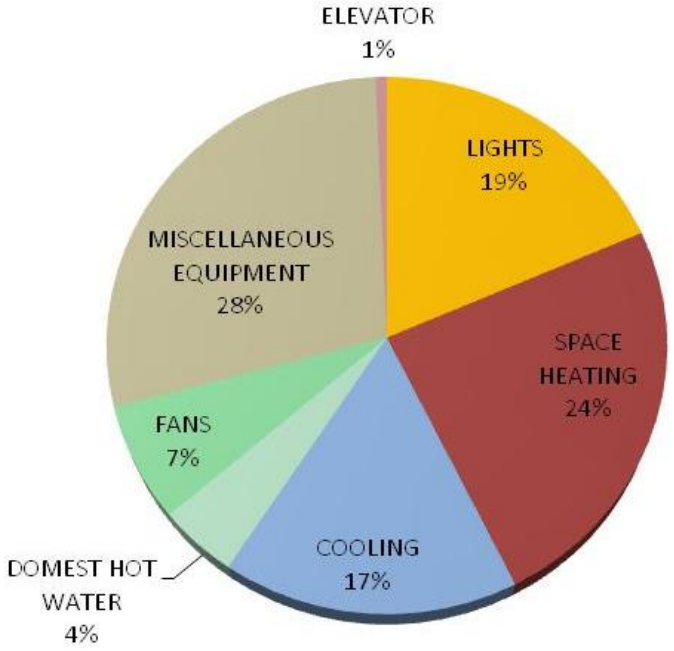
Jim Edelson
jim@newbuildings.org

The Policy Level Context

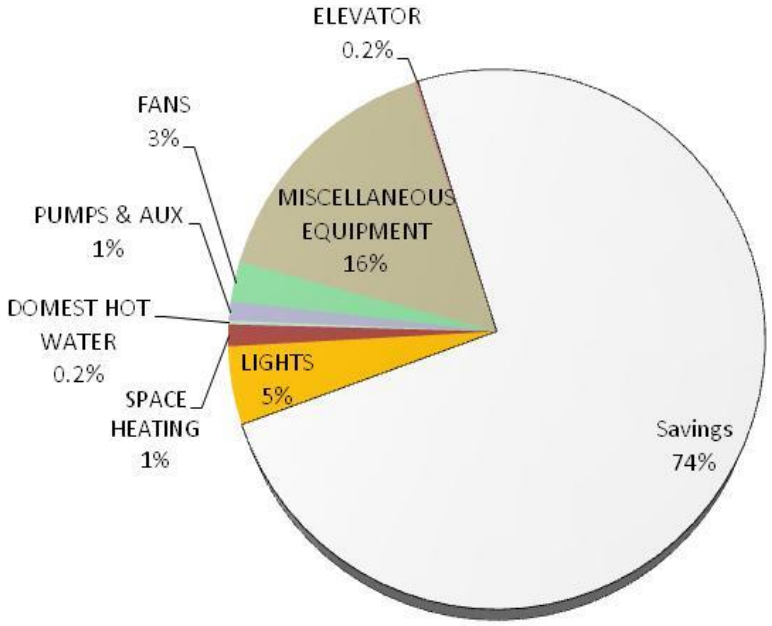


The Building Level Context

Percent Energy Consumption by End Use Before Energy Conservation Measures

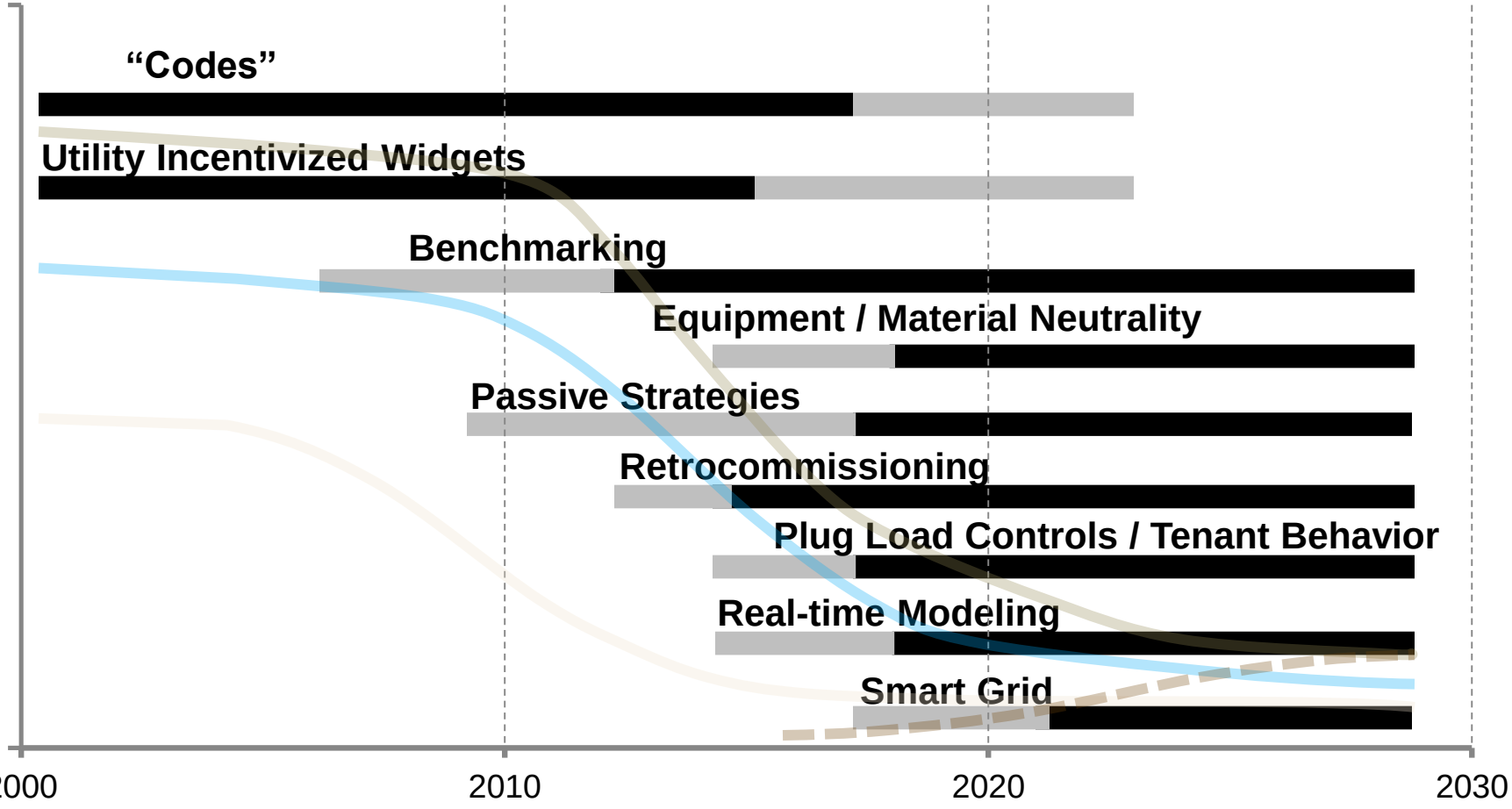


Percent Energy Consumption by End Use After Energy Conservation Measures

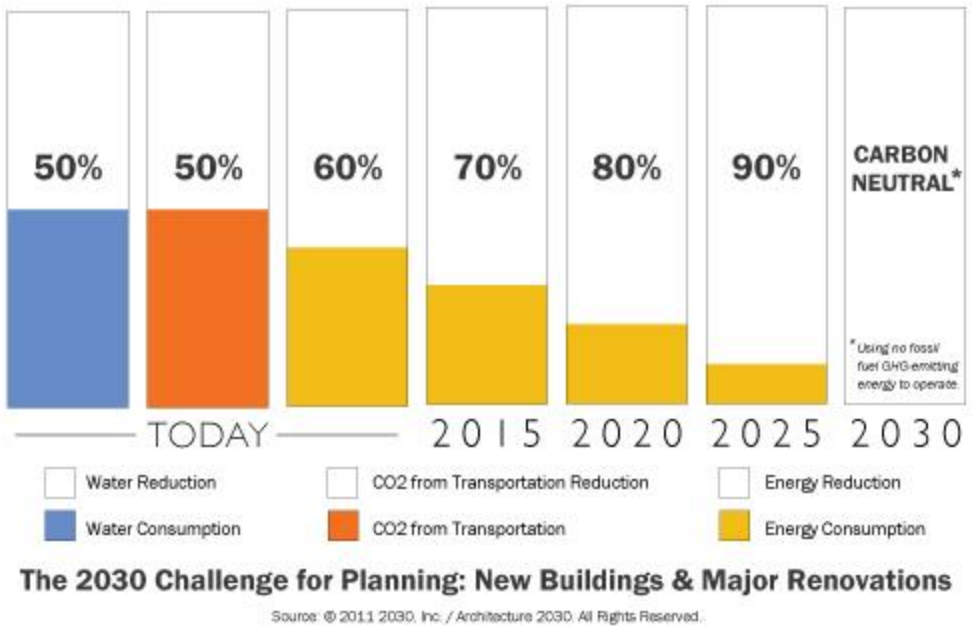


PAE CONSULTING ENGINEERS, INC.

Building Policies / Tools Context



Seattle 2030 District



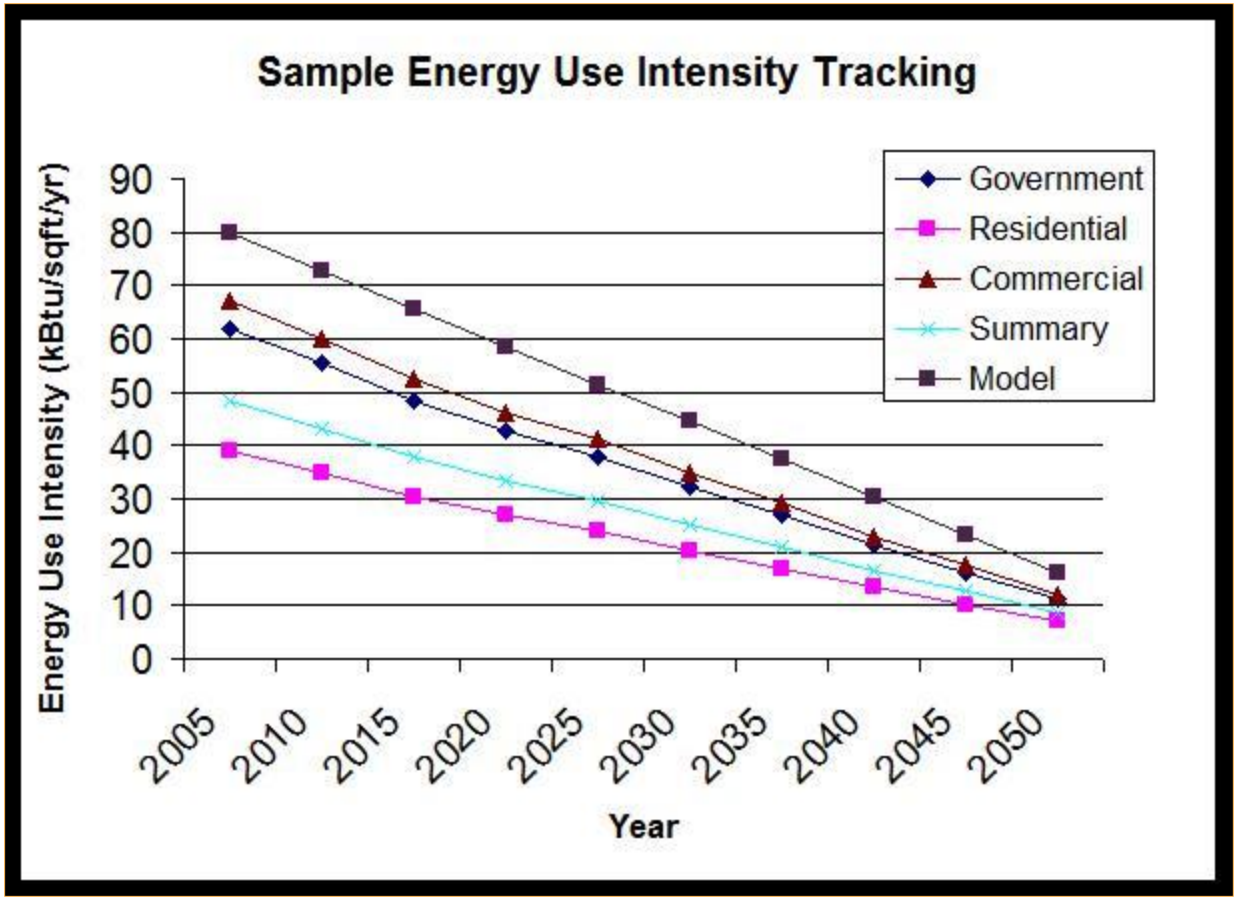
The 2030 Challenge for Planning: New Buildings & Major Renovations

Star Communities Index

www.starcommunities.org/

Star Communities Index

www.starcommunities.org/



California

Key Concepts

- California Global Warming Solutions Act of 2006 (Assembly Bill 32)
- California Public Utility Commissions ordered Big Bold Goals for New Construction
- California Energy Efficiency Strategic Plan guides utilities; leads to Path to Zero in Savings by Design
- CEC sets path to ZNE codes in their bi-annual Energy Plan
- Savings by Design Path to Zero program produced at least 30 ZNE or ultra-low energy buildings in 4 years
- CalGreen (stretch code) supports ZNE code path
- Executive order for new state buildings to be ZNE by 2025

Vermont

Key Concepts

- Comprehensive Energy Plan says VT should establish a "…clear path to achieve a goal of having all new buildings built to net zero design by 2030."
- "Path" means it's not one step to net zero- rather (up to incremental improvements to achieve net-zero goal 5 more code updates before 2030)
- Balance any construction cost increases and construction/technology changes with reducing energy use

WASHINGTON
ENGROSSED SECOND SUBSTITUTE SENATE BILL 5854
61st Legislature
2009 Regular Session

Key Concepts

- . **Sec. 5. (1) Except as provided in subsection (2) of**
- this section, residential and nonresidential construction permitted
- under the 2031 state energy code must achieve a seventy percent
- reduction in annual net energy consumption, using the adopted 2006
- Washington state energy code as a baseline.
- (2) The council shall adopt state energy codes from 2013 through
- 2031 that incrementally move towards achieving the seventy percent
- reduction in annual net energy consumption as specified in subsection
- (1) of this section. The council shall report its progress by December
- 31, 2012, and every three years thereafter.

WASHINGTON
ENGROSSED SECOND SUBSTITUTE SENATE BILL 5854
61st Legislature
2009 Regular Session

Key Concepts

- The strategic plan will identify barriers to achieving net zero energy use
- in homes and buildings and identify how to overcome these barriers in
- future energy code updates and through complementary policies.
- (2) The department must complete and release the strategic plan to
- the legislature and the council by December 31, 2010, and update the
- plan every three years.
- (3) The strategic plan must include recommendations to the council
- on energy code upgrades. At a minimum, the strategic plan must:
- (a) Consider development of aspirational codes separate from the
- state energy code that contain economically and technically feasible
- optional standards that could achieve higher energy efficiency for
- those builders that elected to follow the aspirational codes in lieu of
- or in addition to complying with the standards set forth in the state
- energy code;

Tucson and Pima County
Net-Zero Energy Building Standard

Key Concepts

- **1.** The development of a primary metric called **Energy Use Intensity (EUI)** to measure the predicted and actual energy use. This is analogous to miles per gallon for a car.

  2. The **Embedded Energy To Deliver Water** to the building must be offset by on-site energy production to achieve net zero status.

  3. **Net zero potential** is defined by the ability of the building to generate on-site energy with the energy producing area limited to the building roof (and covered parking in commercial buildings). This requires that buildings be energy efficient.

  4. The Net zero certification will be issued **after one year of performance demonstrates net-zero achievement** . Meeting the requirements in either the prescriptive path or performance path shall be deemed to be in compliance with the requirement of the IECC without regard to the issuance of the net-zero certificate.

ZNE Policy
Concepts and Themes

- ZNE Objective based within a Larger Policy Context
- Executive or legislatively driven
- Buildings strategy to 2020, 2030, or 2050
- Incremental with interim milestones
- Actual performance at ZNE
- “Public” buildings lead; codes follow
- Rapidly expanding field of ZNE policy !

State and Local Policies and Programs to Promote Zero Net Energy Buildings

Chris Wagner, NASEO Program Manager

February 26, 2014

cwagner@naseo.org

About NASEO and State Energy Offices

- NASEO is a non-profit representing the 56 governor-designated energy offices from each state/territory.
- State Energy Offices develop programs/policies related to:
  - Energy efficiency in manufacturing and residential, commercial, and public buildings
  - Renewable energy
  - Oil, gas, electricity production and distribution
  - Energy emergency preparedness and resiliency
- NASEO has collaborated with NBI over the past several years on zero net energy (ZNE) policies and programs.

Presentation Overview

- Examples of State Activity in the Following Areas:
  1. ZNE/High Performance Buildings Tax Credits and Mortgage Incentives
  2. Executive Orders/Governor Action
  3. Catalyzing the Schools Sector
- Summary of Trends and Opportunities

New Mexico Sustainable Buildings Tax Credit

- 2007 Senate Bill 463; administered by New Mexico Energy, Minerals and Natural Resources Department
- Residential:
  1. Build Green NM or LEED-H Silver
  2. HERS score of 60 or lower
  - 2,000 sq. ft. home → $10,000 tax credit
  - $4 million annual cap (2014, 2015, 2016)
  - Over 4,000 credits to date (HERS average ~54/55)
- Commercial:
  1. LEED Silver, Platinum, or Gold
  2. Modeled energy reduction of 60% vs. national average (EPA Target Finder)
  3. Enhanced commissioning (and exploring operational tracking)
  - $1 million annual cap (2014, 2015, 2016)

New Mexico Sustainable Buildings Tax Credit

Hotel Clovis: 1930-era hotel turned apartments and commercial space (Clovis, NM) – had been abandoned

Commercial 2013:

- 2 Macy's
- 1 Church
- 3 Offices
- 1 hotel
- 9-10 multifamily

Link to program details and tiers

Colorado Energy Saving Mortgage Incentive

- HB 13-1105 – June 2013
- Grew out of previous ENERGY STAR New Homes program and Architecture 2030 research
- Administered by Colorado Energy Office (CEO)
- Provides tiered mortgage incentives for both new & existing (e.g. refinance) homes
- Homebuyers select "energy package"
- Secondary goal of **training mortgage lenders/brokers**
- CEO providing building science/sales training

New Town Builders Zero Energy Home

Colorado Mortgage Incentives

Incentive structure ("energy package")

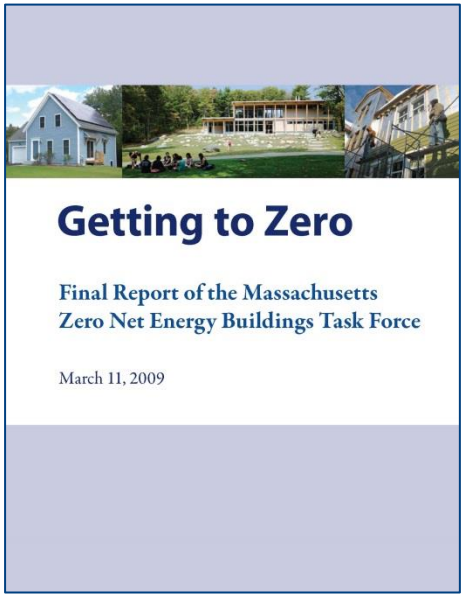
New Homes HERS	Mortgage Incentive
50 – 40	$1,000
39 – 25	$2,500
24 – 11	$3,000
10 and below	$8,000

Link to program details and tiers for existing buildings

- **Non-state match** of mortgage balance required: .5% for existing homes; .6% for new homes
  - Can come from lender, builder, realtor, etc.
  - $300,000 new-home mortgage: state - $6,200; match - $1,800
- Approx. 300 mortgages ready to be reserved (~80% new construction)

Executive Orders/Governor Action

- Executive Orders:
  - California Governor Brown Executive Order B-18-12:
    - 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
  - New Mexico: Governor Richardson Executive Order 2009-002 "Clean Energy State"
- Governor Action:
  - Governor Patrick formed the Massachusetts Zero Net Energy Buildings Task Force
  - Final report contained 44 recommendations for advancing on path toward ZNE buildings



Links to more info on CA and MA

Catalyzing the Schools Sector

- Maryland Energy Administration awarded $9 million as part of utility merger to design and build 3 ZNE public schools
  - 2 counties have been chosen: Howard County and Baltimore City
  - Funds will provide design assistance and pay for "incremental cost"

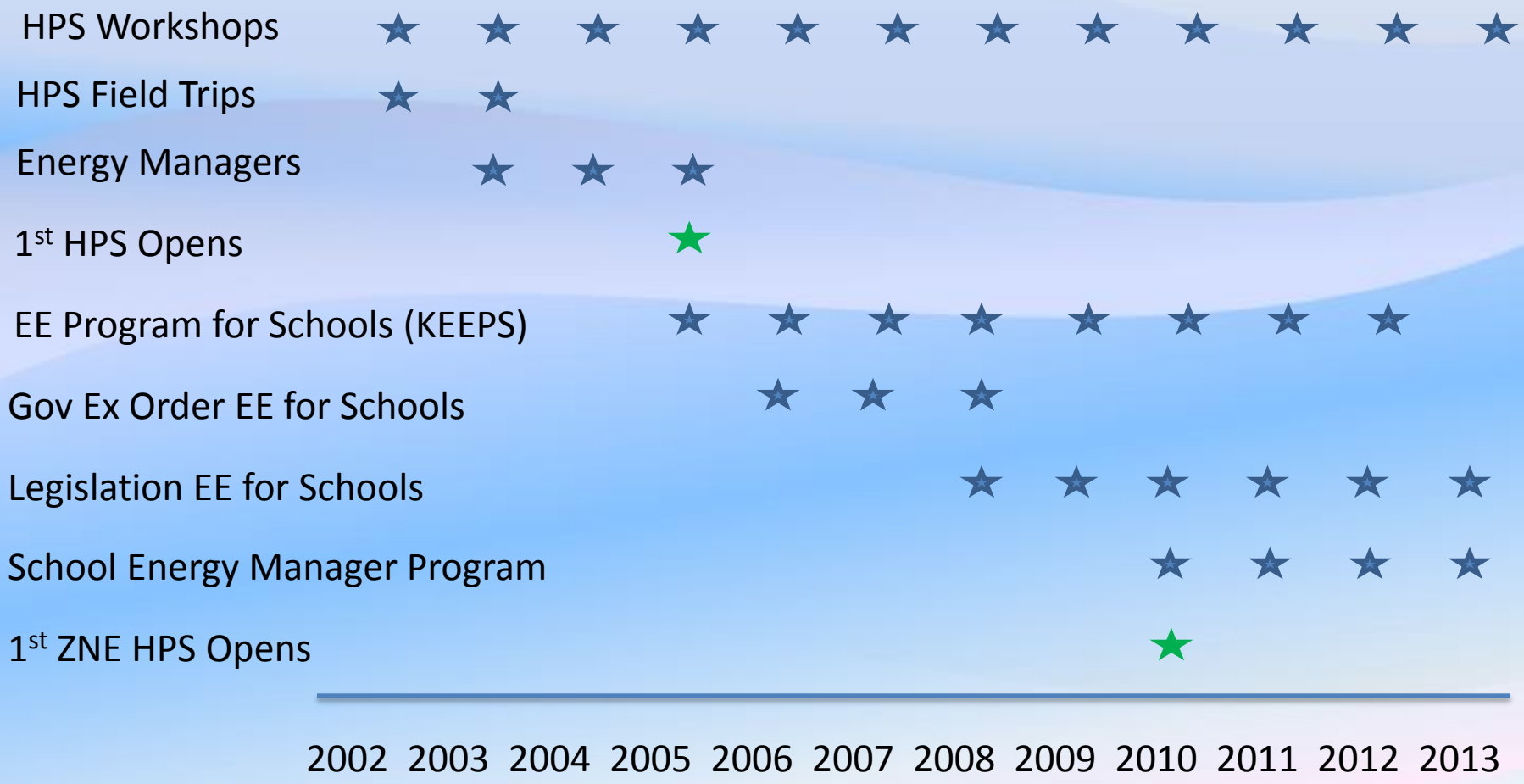
- Kentucky: Home of two verified ZNE schools and one ZNE Emerging school (Turkey Foot Middle School)

Richardsville Elementary

Locust Trace AgriScience High School Campus

Kentucky's High Performance School (HPS) Journey

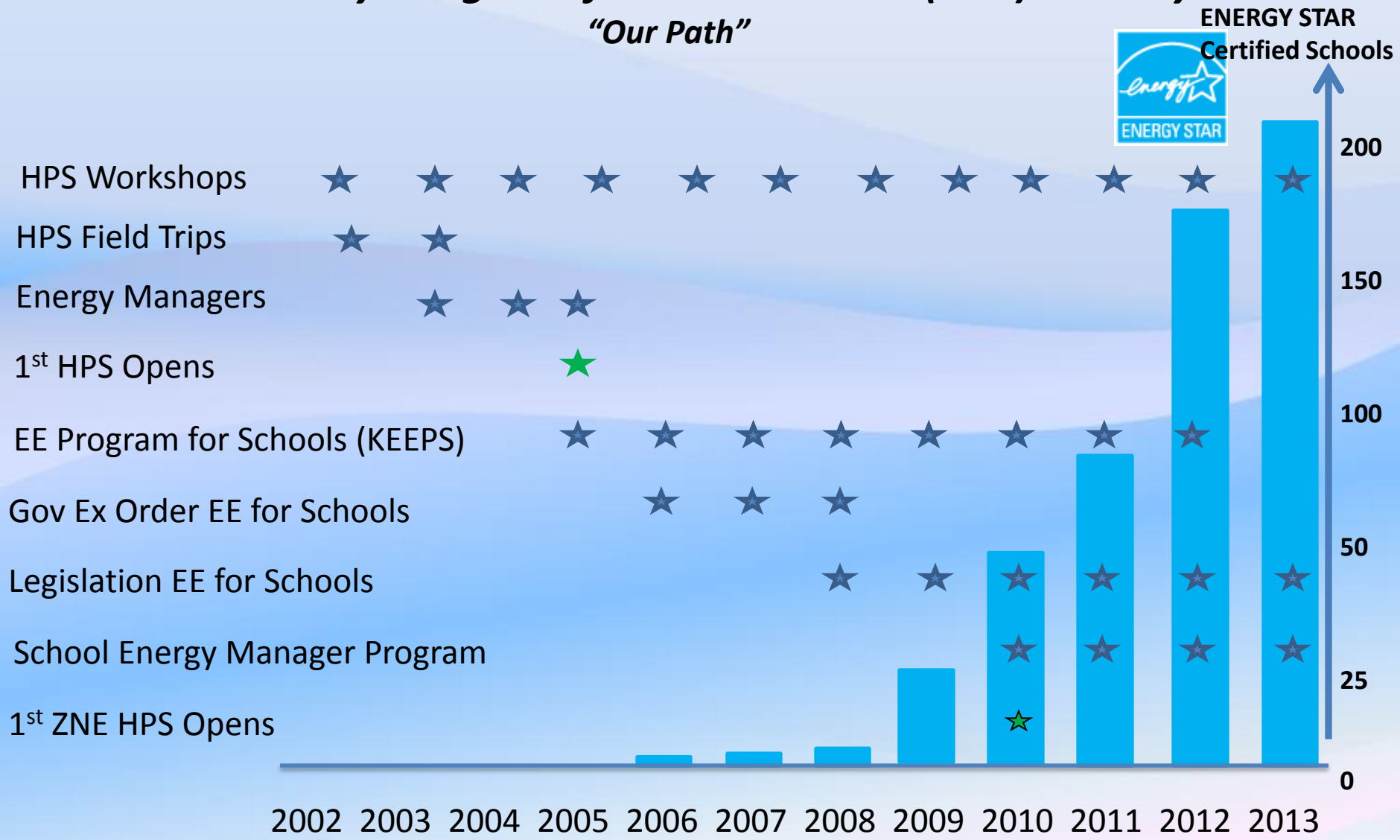
"Our Path"



[Full KY DEDI presentation]

Kentucky's High Performance School (HPS) Journey

"Our Path"



[Kentucky schools program website](); [CMTA presentation on KY Schools]()

DEDI

Trends and Opportunities

1. States are utilizing ZNE as part of **market transformation** efforts that can have wider impact on energy efficiency
2. Energy Offices can leverage convening power and implement successful policies/programs over time
3. Demonstration projects are a key first step
4. Other policies (e.g. benchmarking) help support path to ZNE
5. Progress is incremental: need to meet stakeholders where they are
6. Partnerships, education, and persistence are key

Path to Net Zero Energy Buildings
State of Minnesota

Janet Streff Minnesota Department of Commerce

Tom McDougall The Weidt Group

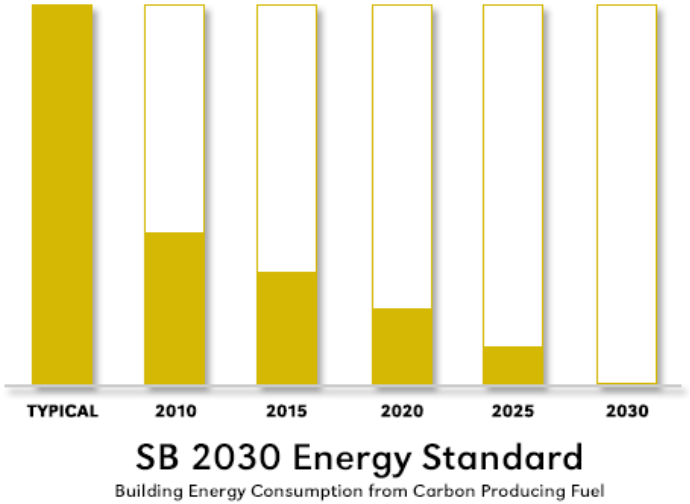
Path to Net Zero Energy Buildings
State of Minnesota

- Minnesota's journey to NZE has been a long and winding road, called B3 which stands for Buildings, Benchmarks & Beyond
- Journey—mapped by Legislature—financed through utility assessments
  - $500K/yr for Guideline and Benchmarking tool maintenance and improvements
  - $500K/yr for SB2030 development and continued training and education
- Utilities also required to integrate its conservation programs (Energy Design Assistance) with these programs
- Initial team chosen in 2004 for development of tools —UMN's Center for Sustainable Building Research, The Weidt Group and LHB Architects—has remained in place, contributing to ongoing success of project

Timeline to Net Zero Energy Buildings
State of Minnesota

- 1998: Hennepin County (Minneapolis) Sustainable Building Guidelines developed
- 2001: State required all public buildings to be benchmarked and that all projects using state bond funds must use Minnesota Sustainable Building Guidelines
- 2004: B3 Benchmarking tool and B3 Minnesota Sustainable Building Guidelines (MSBG) launched
- 2008: Sustainable Building 2030 (SB2030) passed, requiring all public buildings receiving bond funds to integrate SB2030 Energy Standard into design
- 2009: SB2030 Energy Standard inserted into B3 Sustainable Building Guidelines

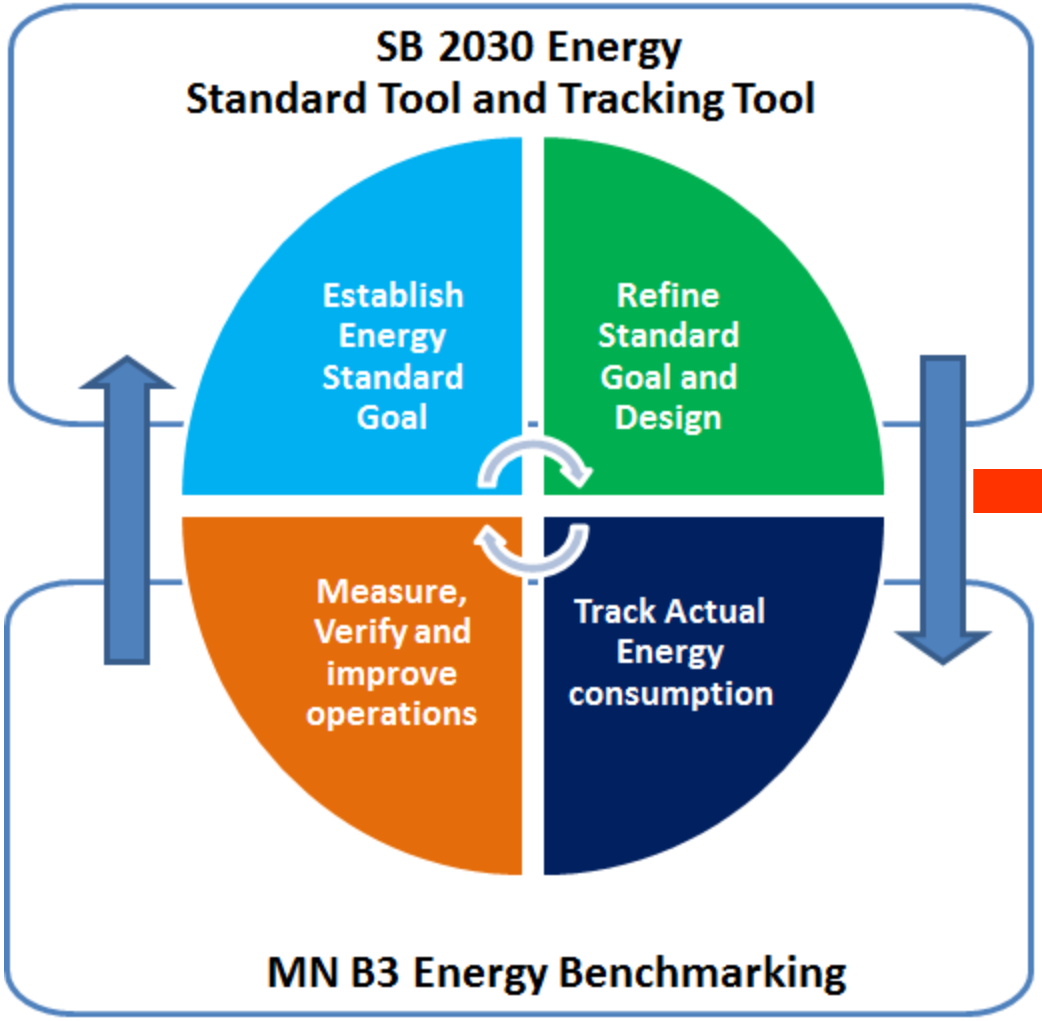
Sustainable Buildings 2030



- Purpose
  - The purpose of SB2030 is to establish cost-effective energy efficiency performance standards for new and substantially reconstructed commercial and institutional buildings, meeting the goals of the Architecture 2030 program to achieve Net Zero Energy Buildings.

- Legislatively Required Elements
  - Develop a program for setting SB2030 Energy Standard targets and meeting them in design
  - Assist in development of utility incentive programs incorporating the SB2030 program
  - Develop case study database and track building performance
  - Deliver training program for design professionals
  - Develop an energy efficient operations program

Influencing Building Performance
During Design and Ongoing Operations



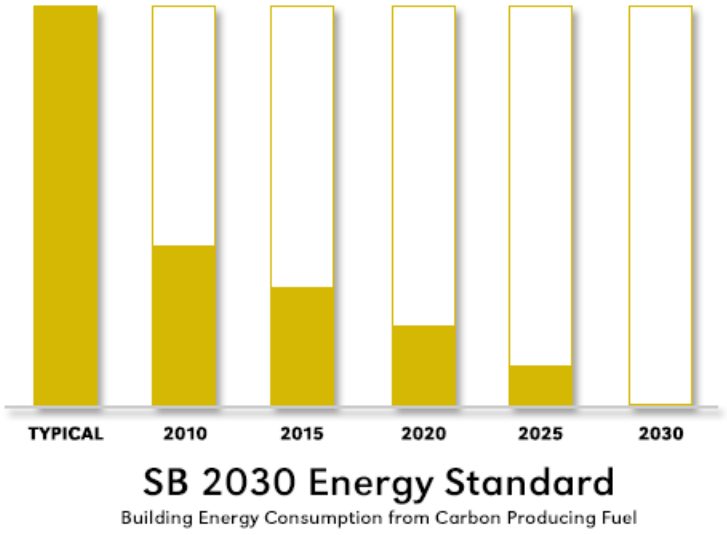
Energy Goal Driven Design

Case Study Public Portal to Present Results and to Show What was Done

Energy Goal Driven Operation

Sustainable Buildings 2030

Program Elements – 5 Steps

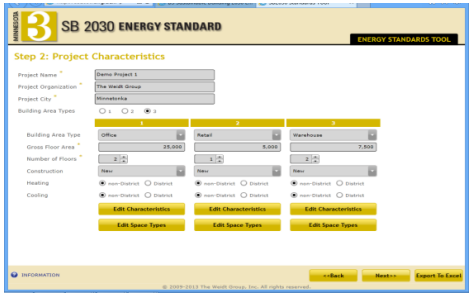


1. Set Arch 2030 EUI design goal based on custom project program characteristics
2. Track design team energy performance and implementation strategies through design phases
3. Verify design model characteristics with design goal characteristics
4. Track ongoing actual energy consumption and compare to design target on a monthly basis
5. Disclose building results, label, performance and the strategies implemented by project in a case study posted on public website

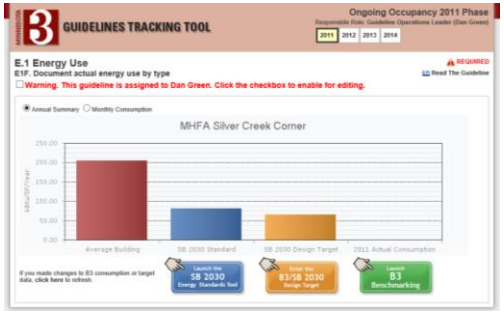
How the Program Works

- Uses a web-based workflow tool that makes all building owners and design teams accountable for the projects' performance
- Establishes a custom energy target for specific building program parameters and climate location

- Set Target by Building Program and Climate



- Enter Design Performance and Strategies



- Track Actual Energy and Compare to Target

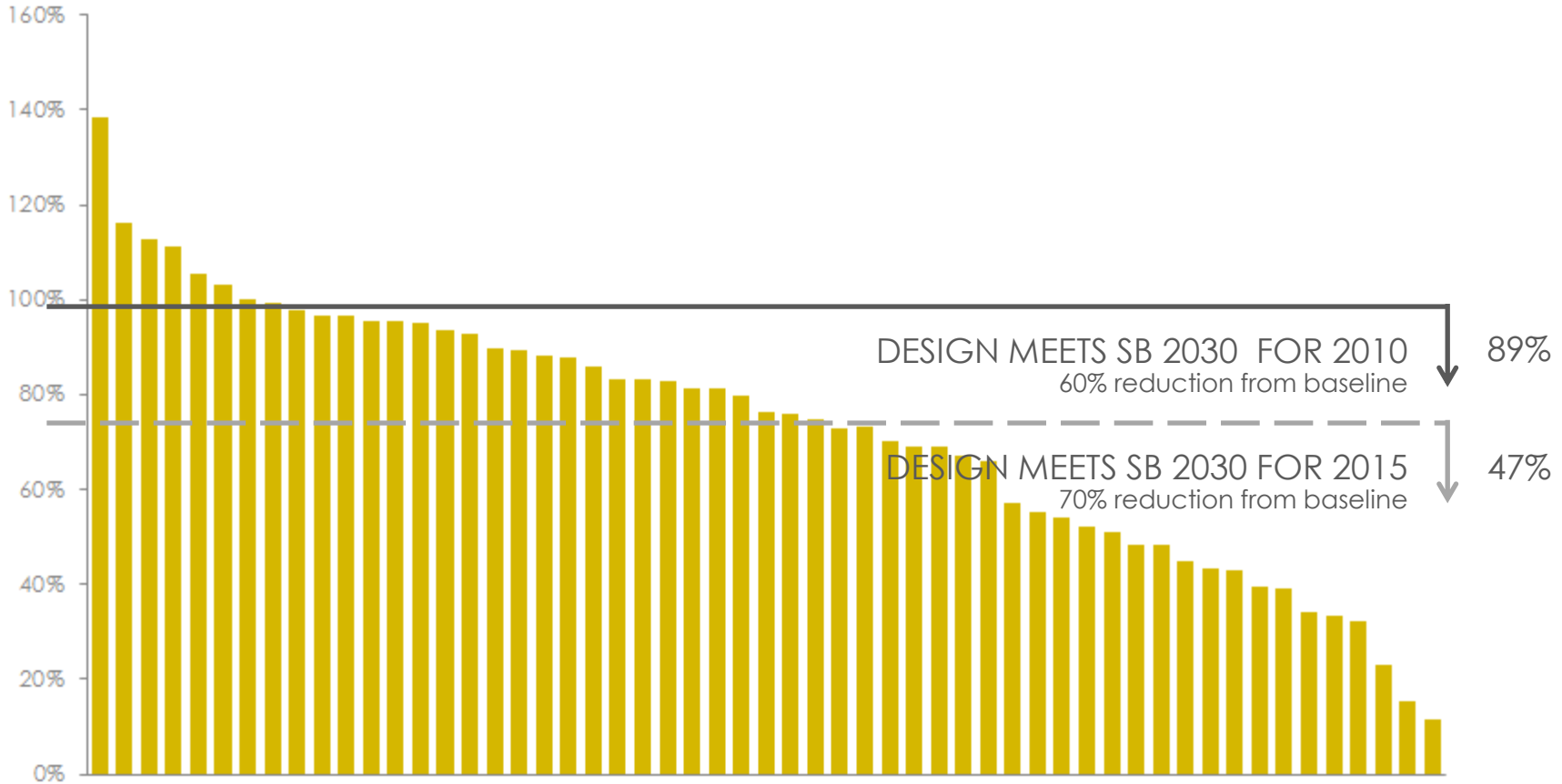
Impact of B3 Programs

- B3 Guidelines
  - 258 projects in B3 Guidelines (including SB2030 projects)

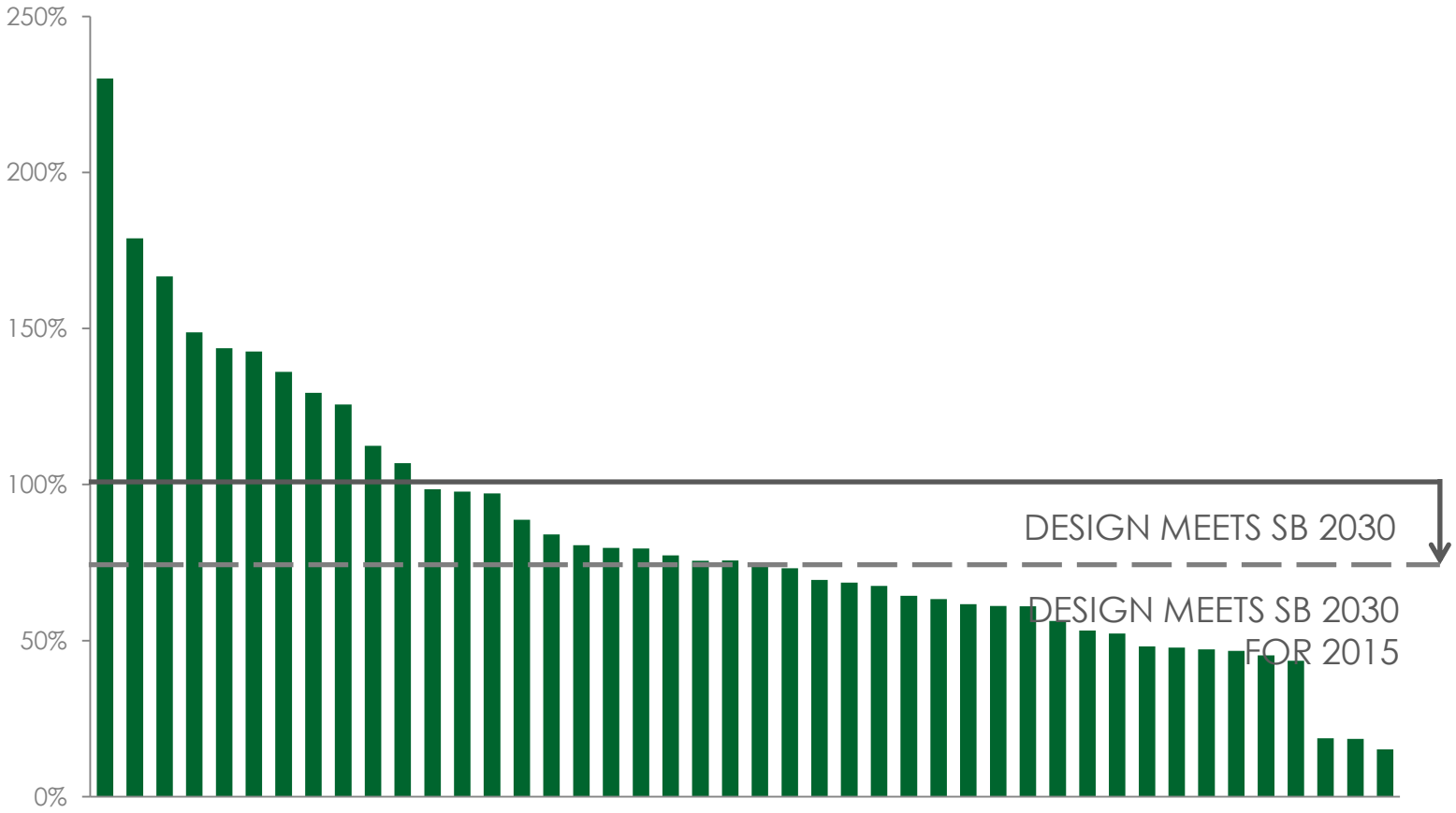
- SB2030 Program
  - 40 buildings from 2009-2012 (now over 70)
  - Savings of 250 million kBtus/year
  - Savings of $3.25 million per year

- B3 Benchmarking from 2004
  - Over 7,500 buildings representing over 300 million SF in program
  - Identified over 1,500 building candidates for improvement
  - Potential Savings of 23 million dollars per year identified

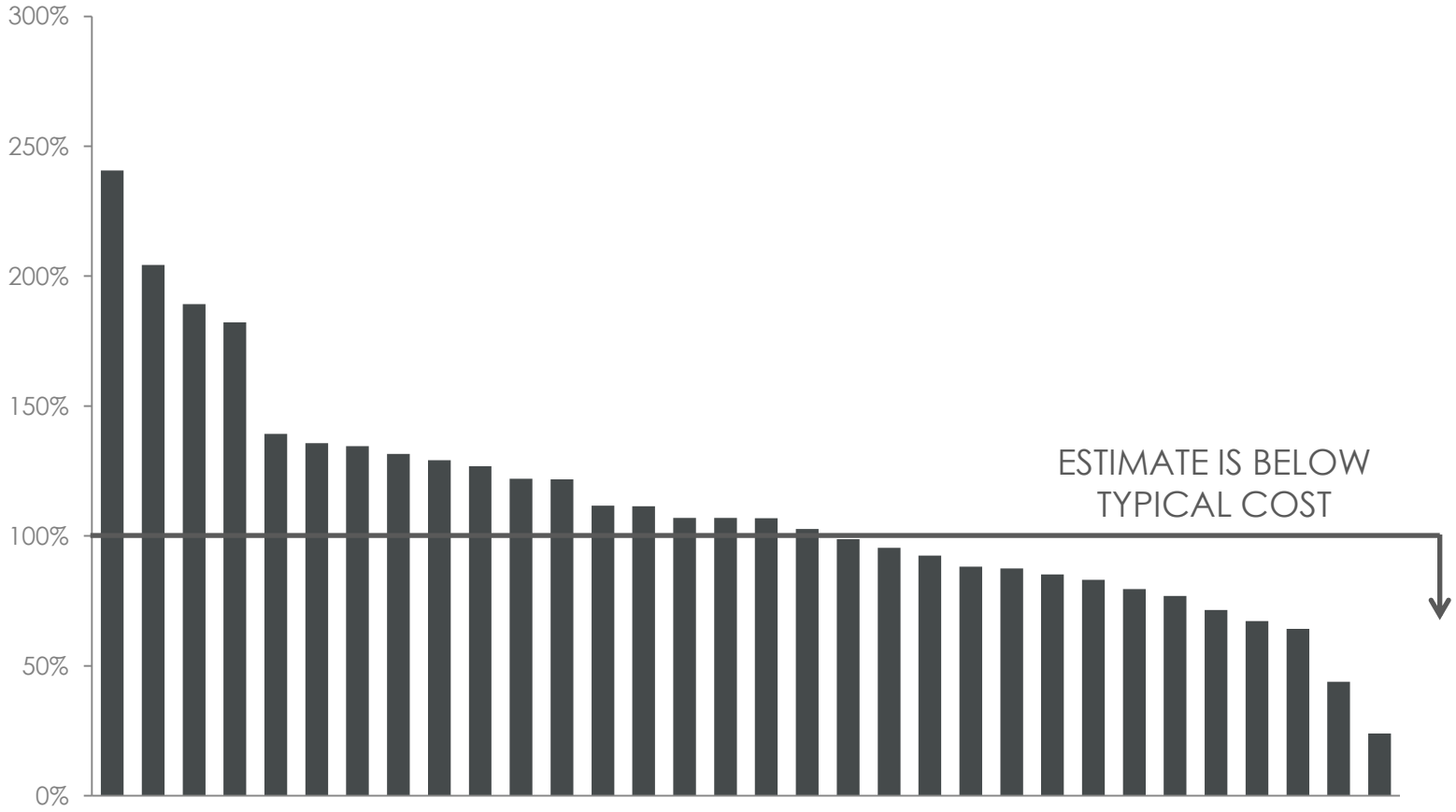
Building Performance



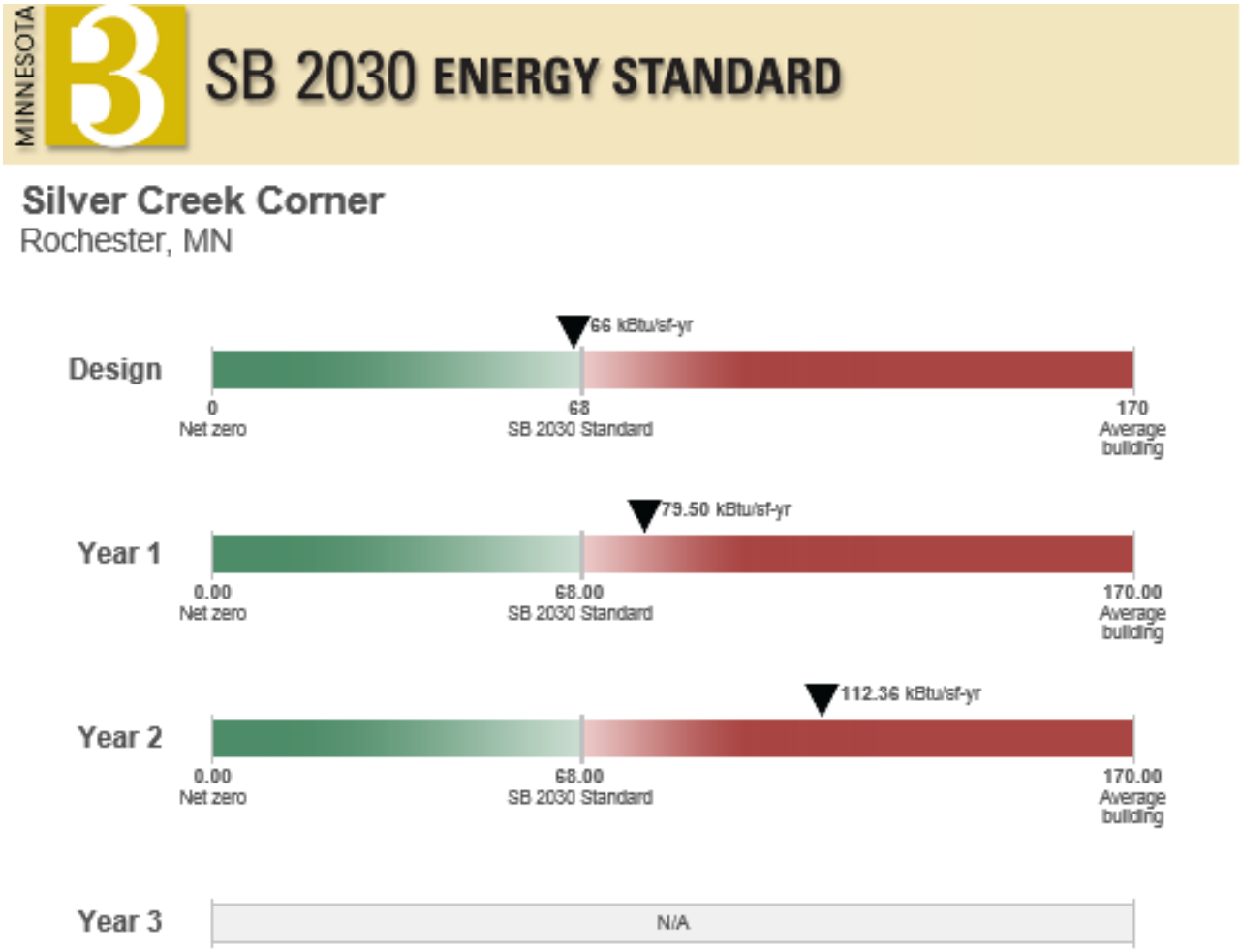
Results
Carbon Dioxide Equivalents



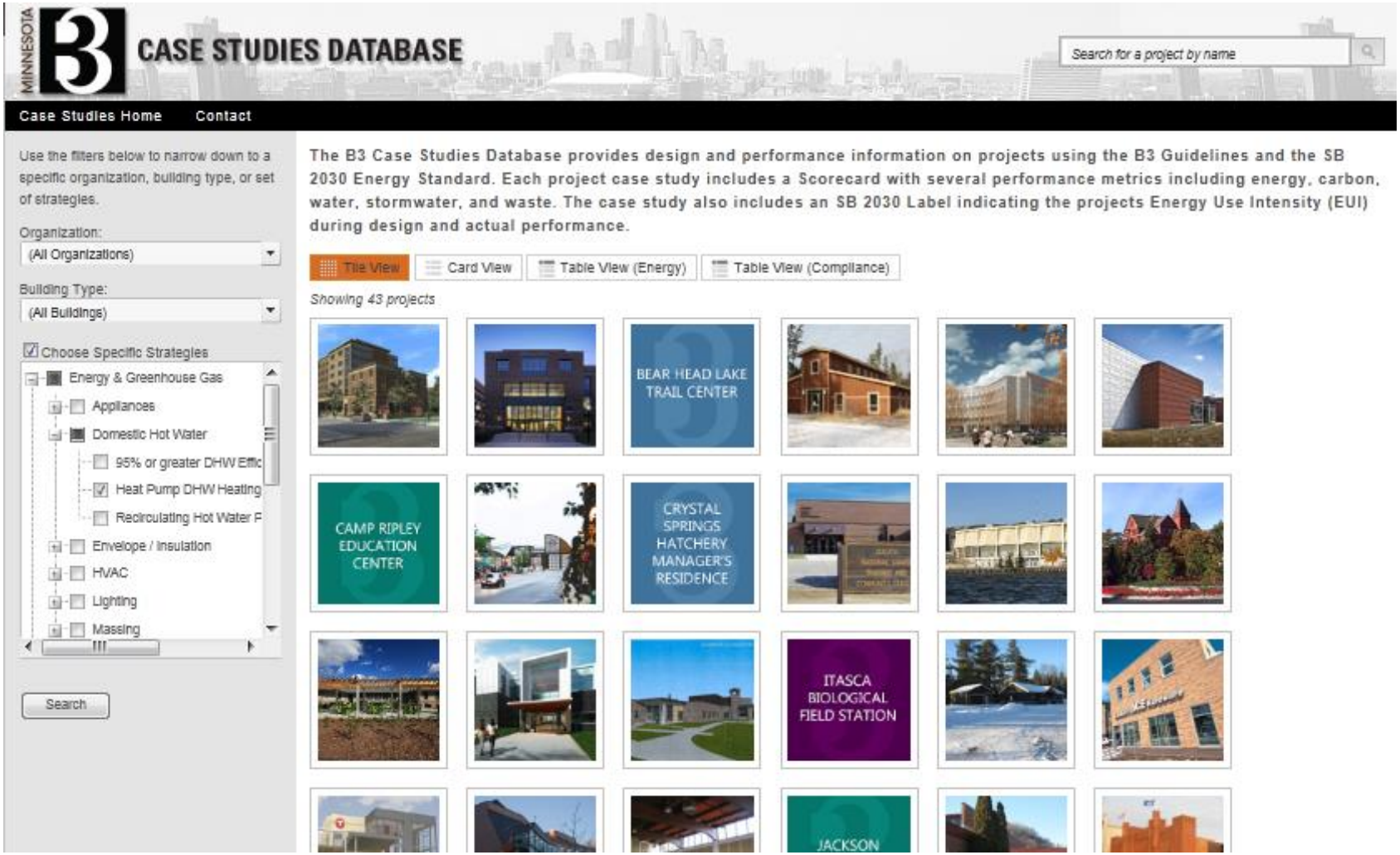
Results
Construction Costs



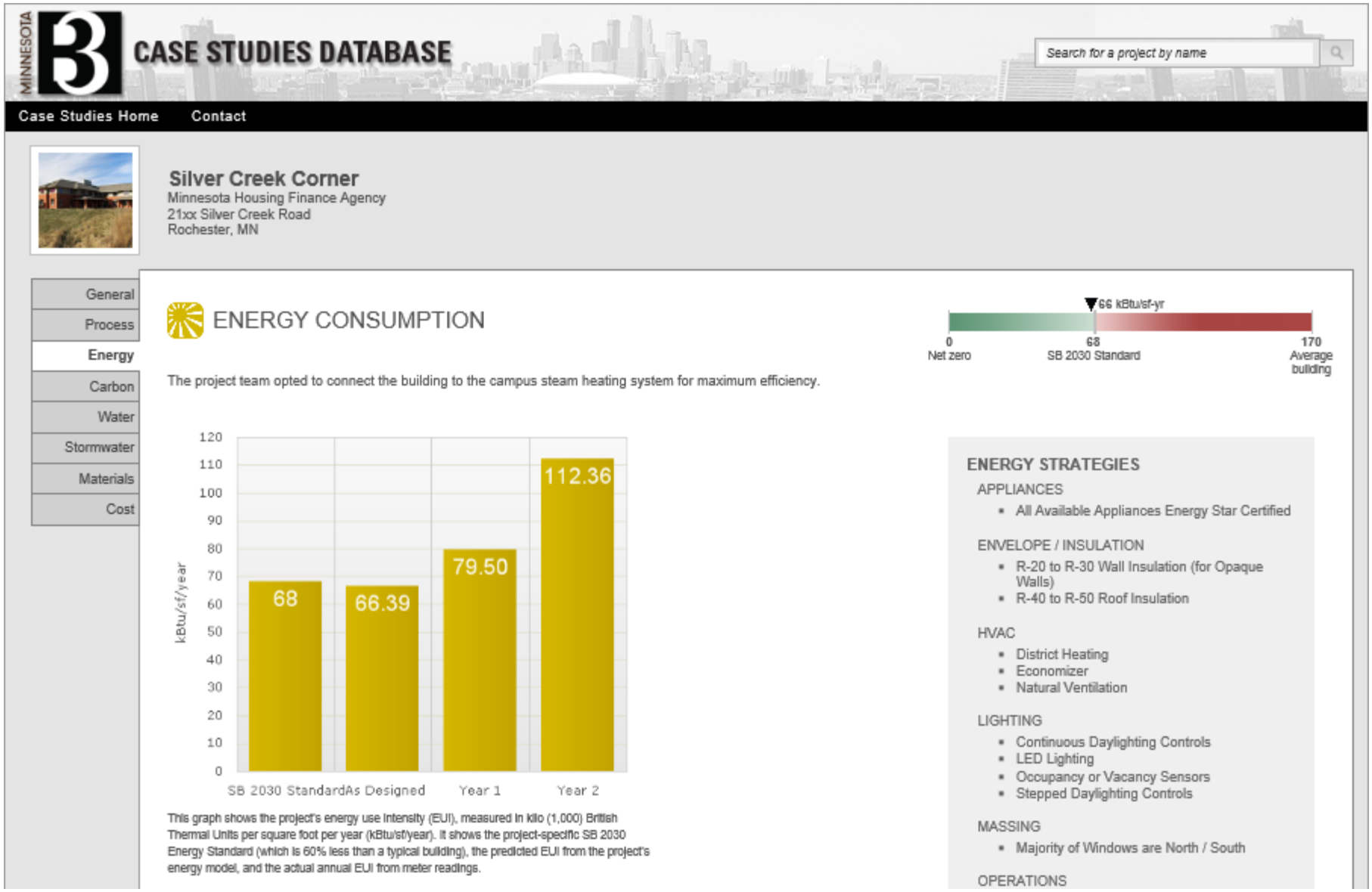
SB 2030 On-Going Label

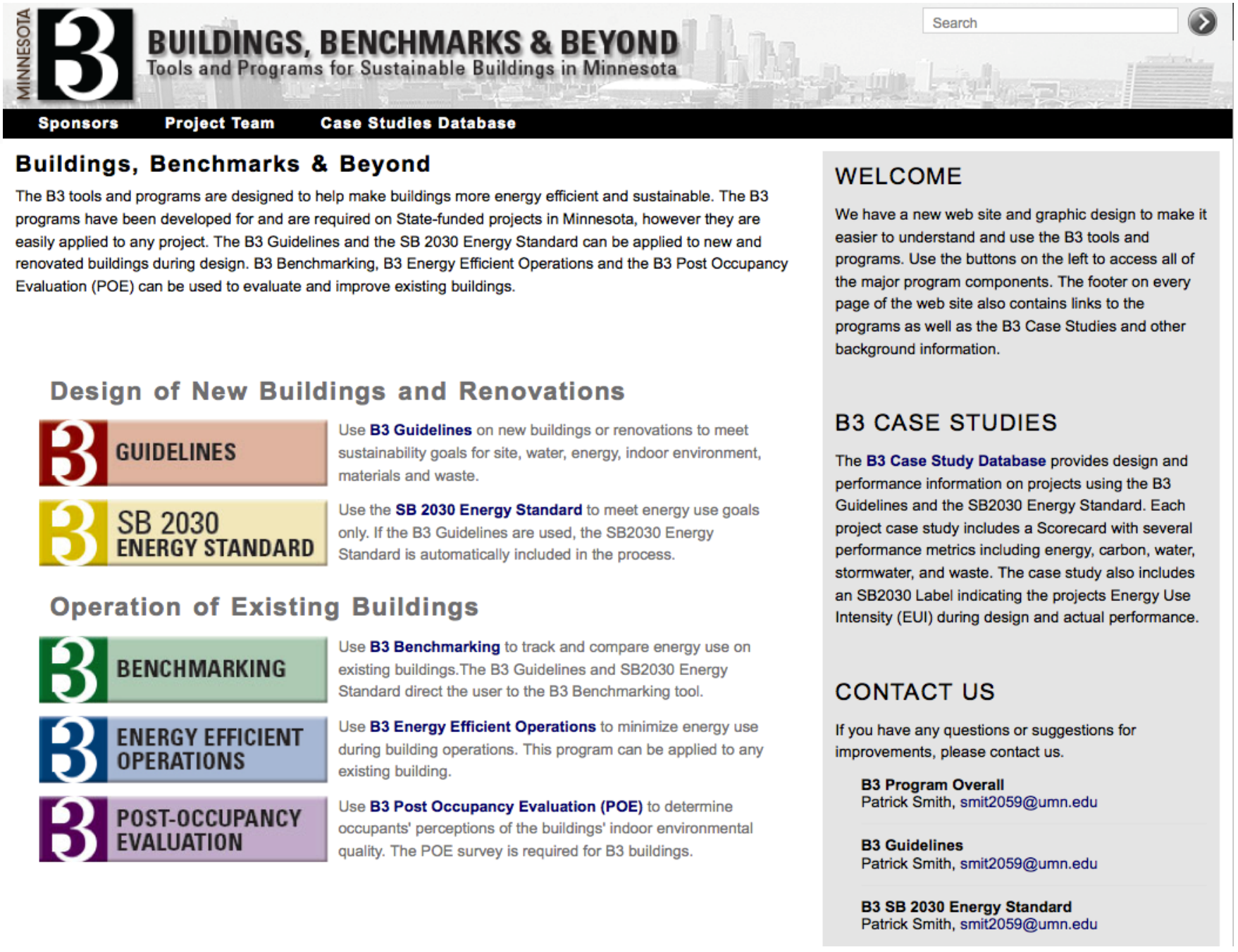


Case Study Database
Public Disclosure and Education



Case Study Database
Public Disclosure and Education





zero net energy

ZNE for Policymakers & Local Governments

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

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.

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 itself.

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 insevere 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

A new Salt Lake City Public Safety Building is designed to achieve ZNE. Bond funding for construction was approved by more than 65% of voters.

energy upgrade CALIFORNIA

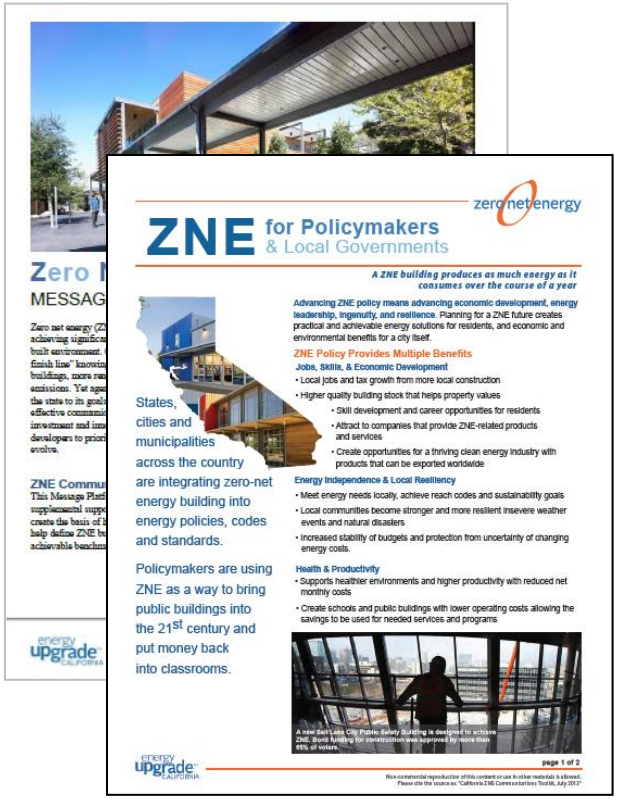
page 1 of 2

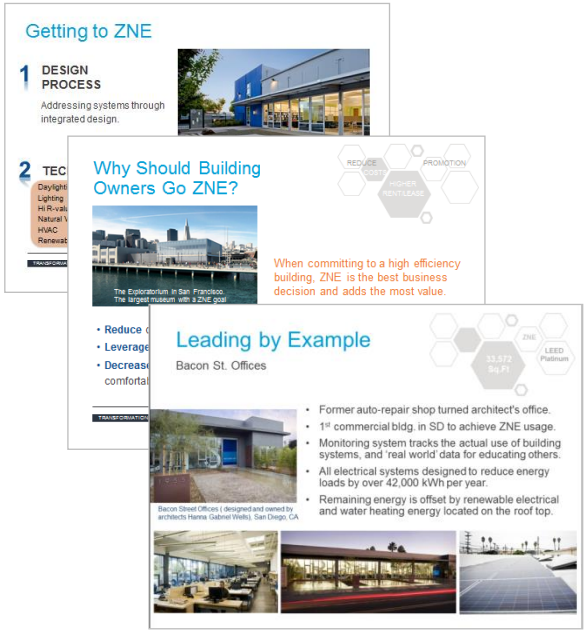
Q and A

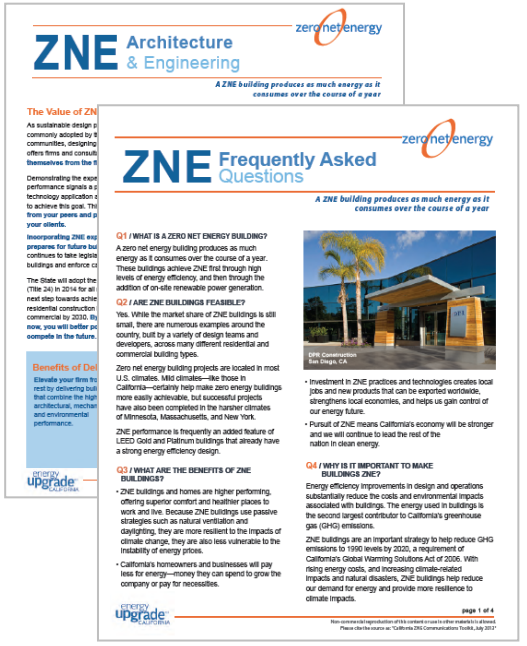
Please type questions into the comment box

NBI Resources:

ZNE CA Communications Toolkit







Message Platform & ZNE for Policymakers

Sample Presentation

Fact Sheets

nbi new buildings institute

www.newbuildings.org