SEE Action

STATE & LOCAL ENERGY EFFICIENCY ACTION NETWORK

Developing Performance-Based Policies for Commercial Buildings

June 12, 2014

State and Local Energy Efficiency Action Network
Existing Commercial Buildings Working Group

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Agenda

Carolyn Sarno, Northeast Energy Efficiency Partnerships

- Greater Energy Savings through Building Energy Performance Policy: Four Leading Policy Program Options

Sean Denniston, New Buildings Institute

- Improving the Performance of Public Building Portfolios

Sheila Miller, Building Owners & Managers Association-Greater Minneapolis

- Greater Minneapolis Kilowatt Crackdown Program

Tom Rooney, TRC Energy Services on behalf of the New Jersey Clean Energy Program

- Whole Building Approaches for Existing C&I Buildings: New Jersey's Pay for Performance Program

Question & Answer Session

- Facilitated by Aleisha Khan, ICF International

Speakers

Carolyn Sarno,
Northeast Energy Efficiency Partnerships

Sean Denniston,
New Buildings Institute

Sheila Miller,
Building Owners and Managers Association-Greater Minneapolis

Tom Rooney,
TRC Energy Services, on Behalf of the New Jersey Clean Energy Program

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STATE & LOCAL ENERGY EFFICIENCY ACTION NETWORK

SEE Action Existing Commercial Building Working Group Resources

Carolyn Sarno

Northeast Energy Efficiency Partnerships

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About SEE Action

- Network of 200+ leaders and professionals, led by state and local policymakers, bringing energy efficiency to scale
- Support energy efficiency policy and program decision making for:
  - Utility regulators, utilities and consumer advocates
  - Legislators, governors, mayors, county officials
  - Air and energy office directors, and others
- Facilitated by DOE and EPA; successor to the National Action Plan for Energy Efficiency

The SEE Action Network is active in the largest areas of challenge and opportunity to advance energy efficiency

SEE Action
STATE & LOCAL ENERGY EFFICIENCY ACTION NETWORK

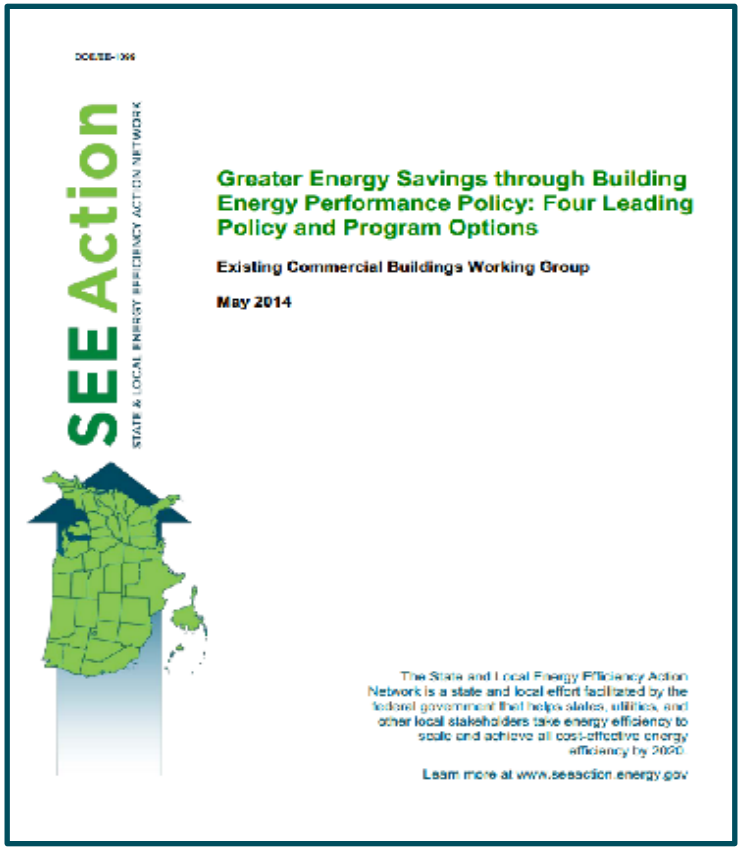
What SEE Action Does

Offers ***investment-grade decision support*** for state and local policy makers.

Provides ***solution pathways through market and policy barriers*** to greater investment in cost-effective energy efficiency.

- Guidance Documents
- Trainings
- Peer-to-peer dialogue
- Technical Assistance

Goal: All cost-effective energy efficiency by 2020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Greater Energy Savings through Building Energy Performance Policy: Four Leading Policy and Program Options

Existing Commercial Buildings Working Group

May 2014

The State and Local Energy Efficiency Action Network is a state and local effort facilitated by the federal government that helps states, utilities, and other local stakeholders take energy efficiency to scale and achieve all cost-effective energy efficiency by 2020.

Learn more at www.seeaction.energy.gov

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Performance-Based Policies Paper

- **Vision Statement**
  - Vision for Performance Based Policies in Commercial Buildings Going Forward

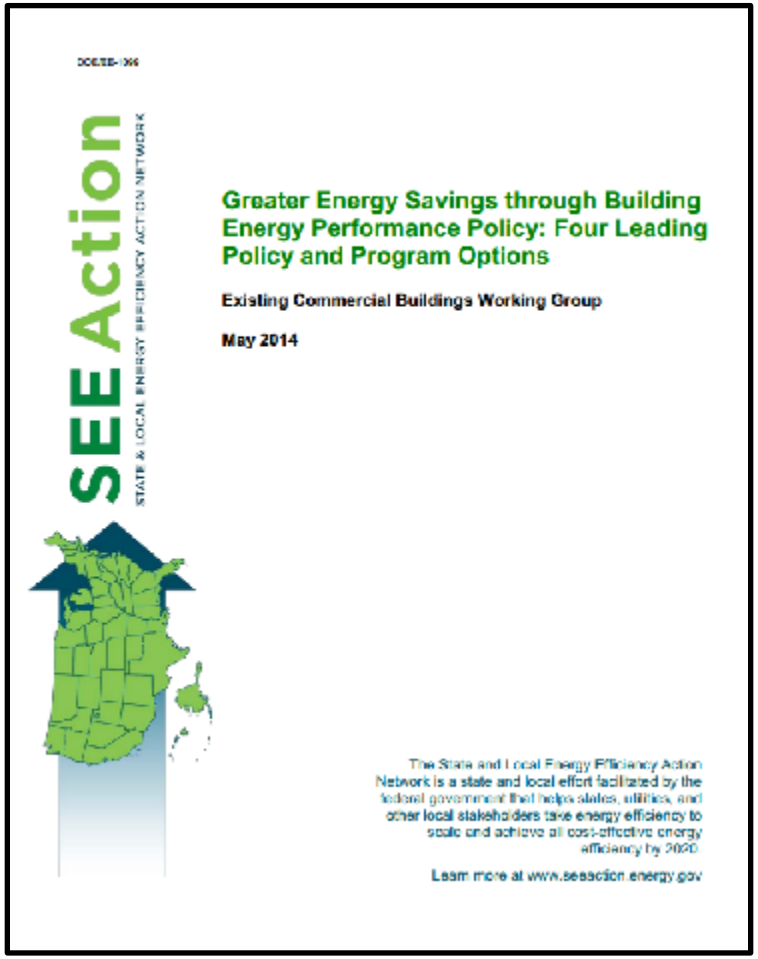
- **Policy Background**
  - Addressing the Data Gap
  - Workforce Training and Credentialing

- **Four Leading Policy and Program Options**
  - Outcome Based Building Policies
  - Performance Incentives
  - Property Valuation and Appraisal Policies
  - Utility Program Policy and Partnerships

For More Information

Access "**Greater Energy Savings through Building Energy Performance Policy: Four Leading Policy and Program Options**" here:

http://www1.eere.energy.gov/seeaction/pdfs/building_energy.pdf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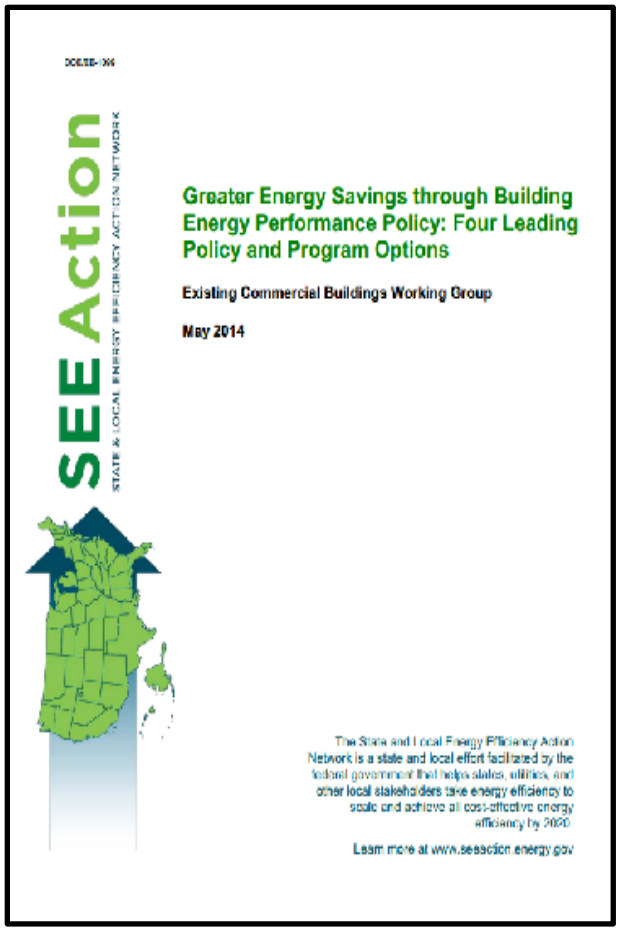
Related SEE Action Resources

- Benchmarking and Disclosure: State and Local Policy Design Guide and Sample Policy Language

- A Utility Regulator's Guide to Data Access for Commercial Building and Energy Performance Benchmarking

- Energy Audits and Retro-Commissioning: State and Local Policy Design Guide and Sample Policy Language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Community Building Renewal: Improving Performance of Public Building Portfolios

Sean Denniston

New Buildings Institute

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Expanding Policy Frameworks to include Performance-Based Building Policies

Performance-based policies can help drive efficiency in individual buildings and markets by:

- **Adapting to changing conditions over time.**
  - New occupants
  - Reconfigured Spaces
  - Aging Equipment
- **Documenting energy performance data.**
  - Benchmark building to compare with similar buildings.
- **Providing Information at Time of Sale.**
  - Building data can provide information on operating costs at time of sale and help increase the value of energy efficiency in the market.

Expanding Policy Frameworks to include Performance-Based Building Policies

Performance-based policies can help increase efficiency through out the building lifecycle:

- **Design Phase**
  - Adjust energy design software to improve accuracy of energy use estimations.
- **Construction Phase**
  - Collect data during building start-up to fine tune equipment and achieve design performance levels.
- **Occupancy Phase**
  - Identify major failures in building systems.
  - Provide building operators with more information to adjust and improve building systems.

Community Building Renewal:

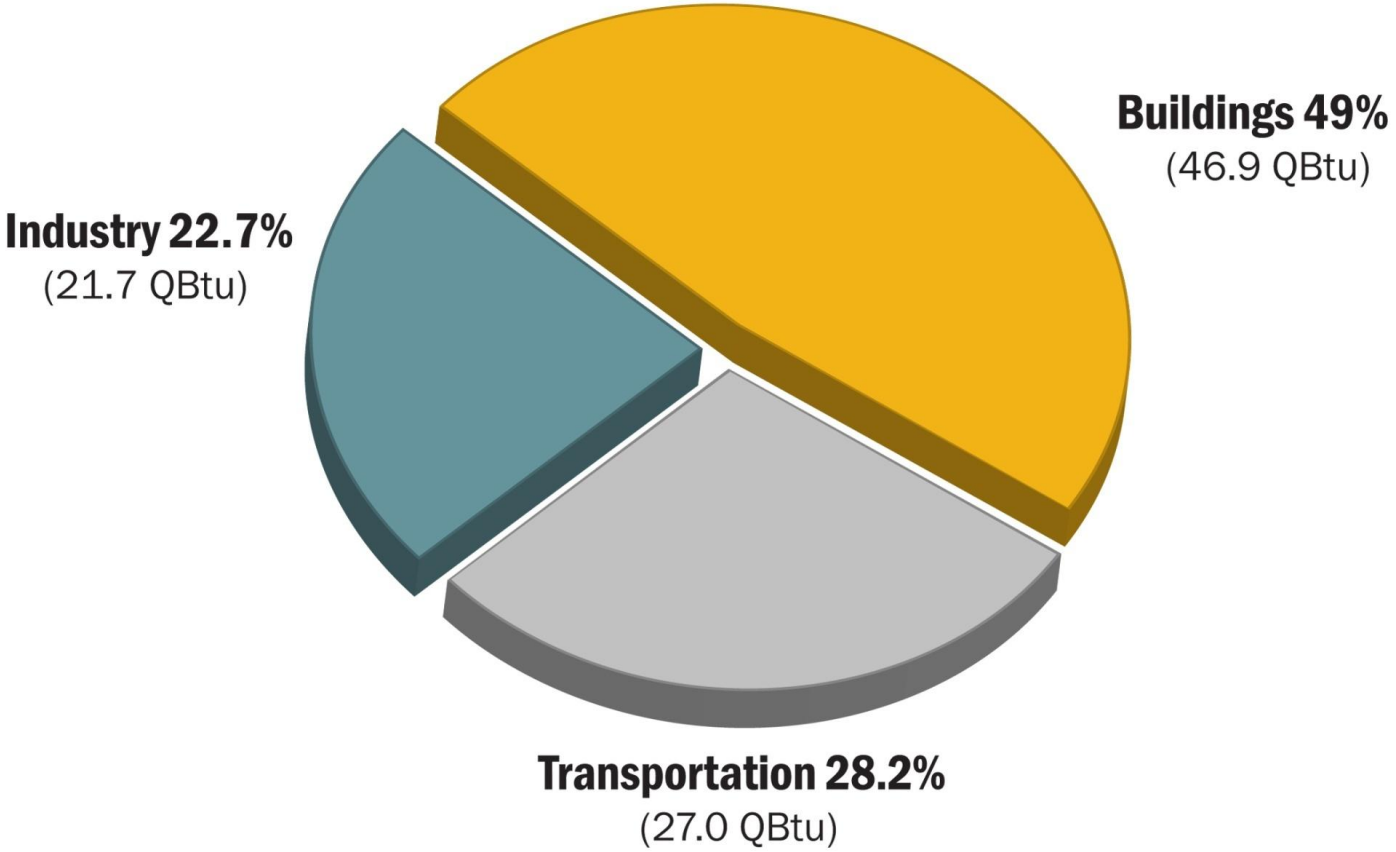
Improving the Performance of Public Building Portfolios

nbi new buildings institute

NBI © 2014

neea

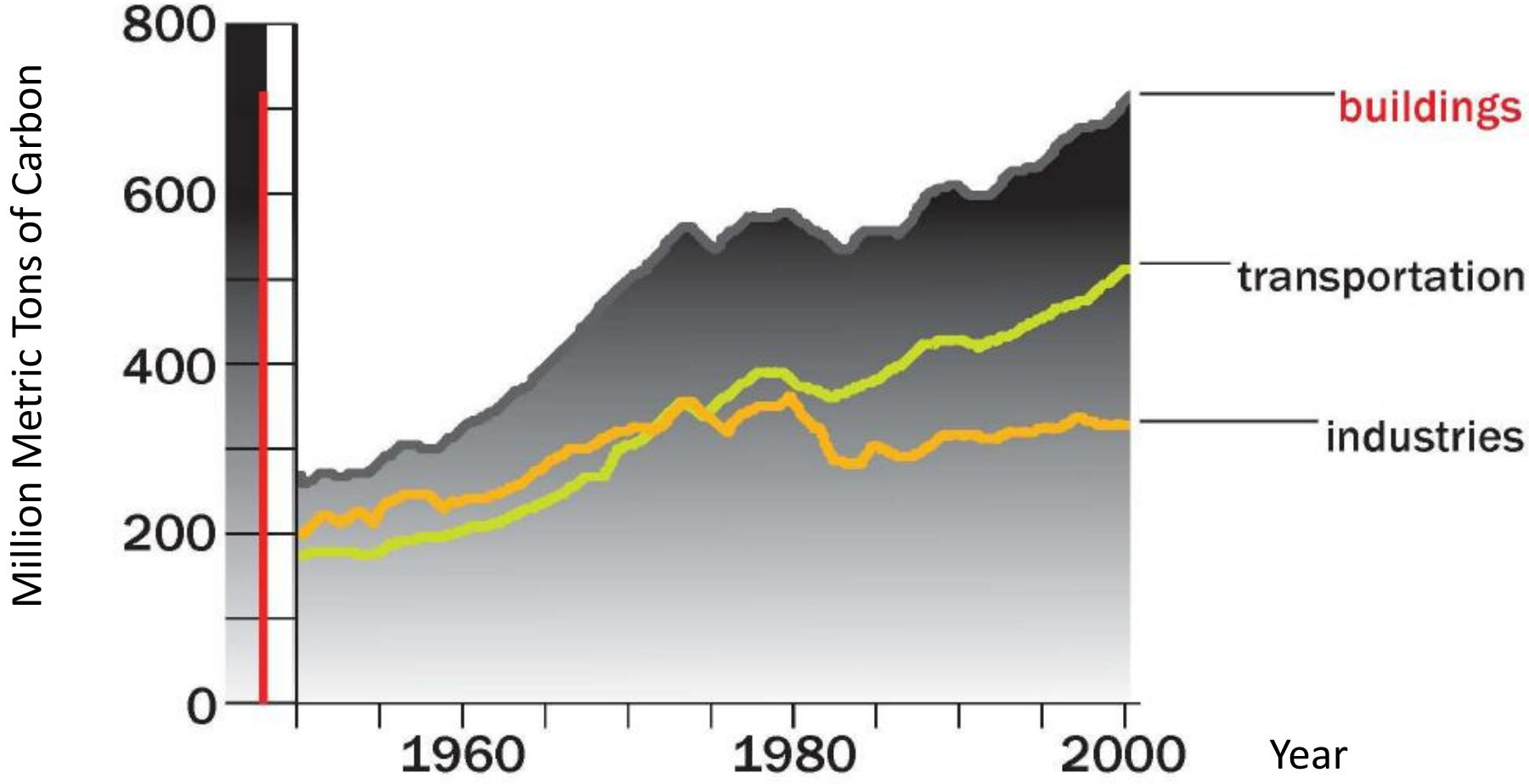
Building Sector Energy Consumption



U.S. Energy Consumption by Sector

Source: ©2010 2030, Inc. / Architecture 2030. All Rights Reserved.
Data Source: U.S. Energy Information Administration (2009).

Building Sector Carbon Emissions



Source: Architecture 2030

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Focus on the Whole Portfolio of Buildings

- Existing Buildings
- New Construction
- Major Renovation
- Demolition

Source: US Energy Information Association

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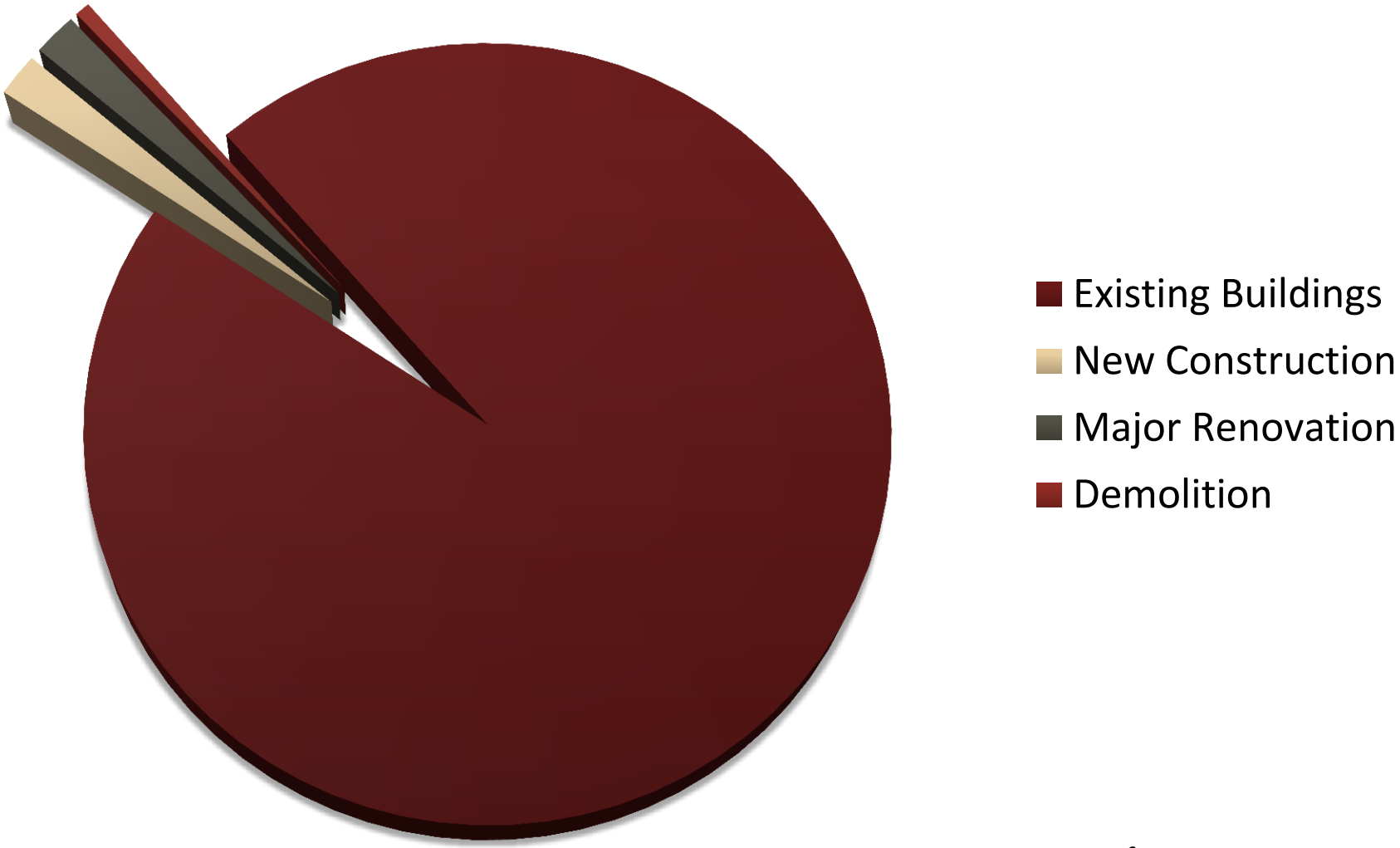

Source: US Energy Information Association

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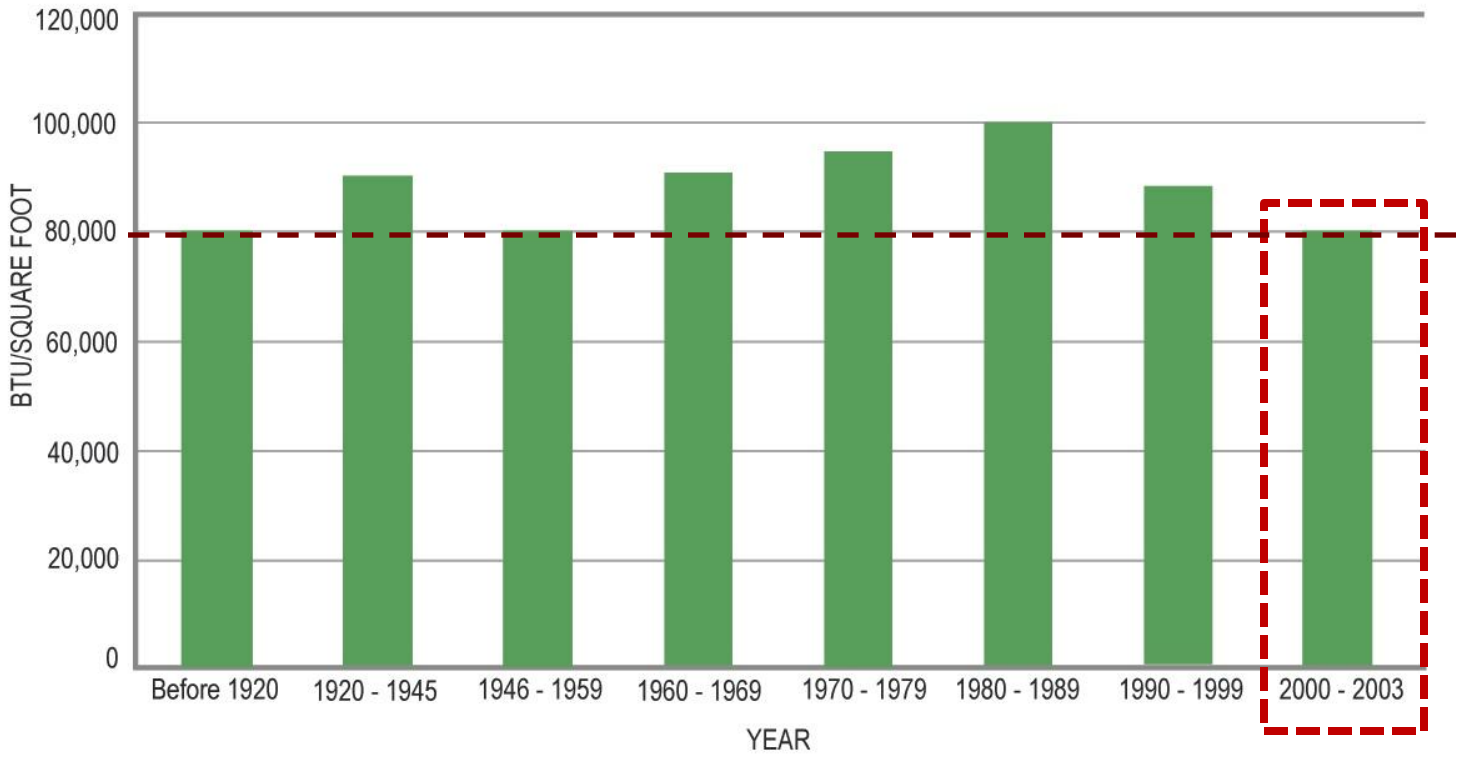
Commercial Building Performance by Vintage



Source: Energy Information Administration, 2003
Published in *The City in 2050: Creating Blueprints for Change*; Urban Land Institute

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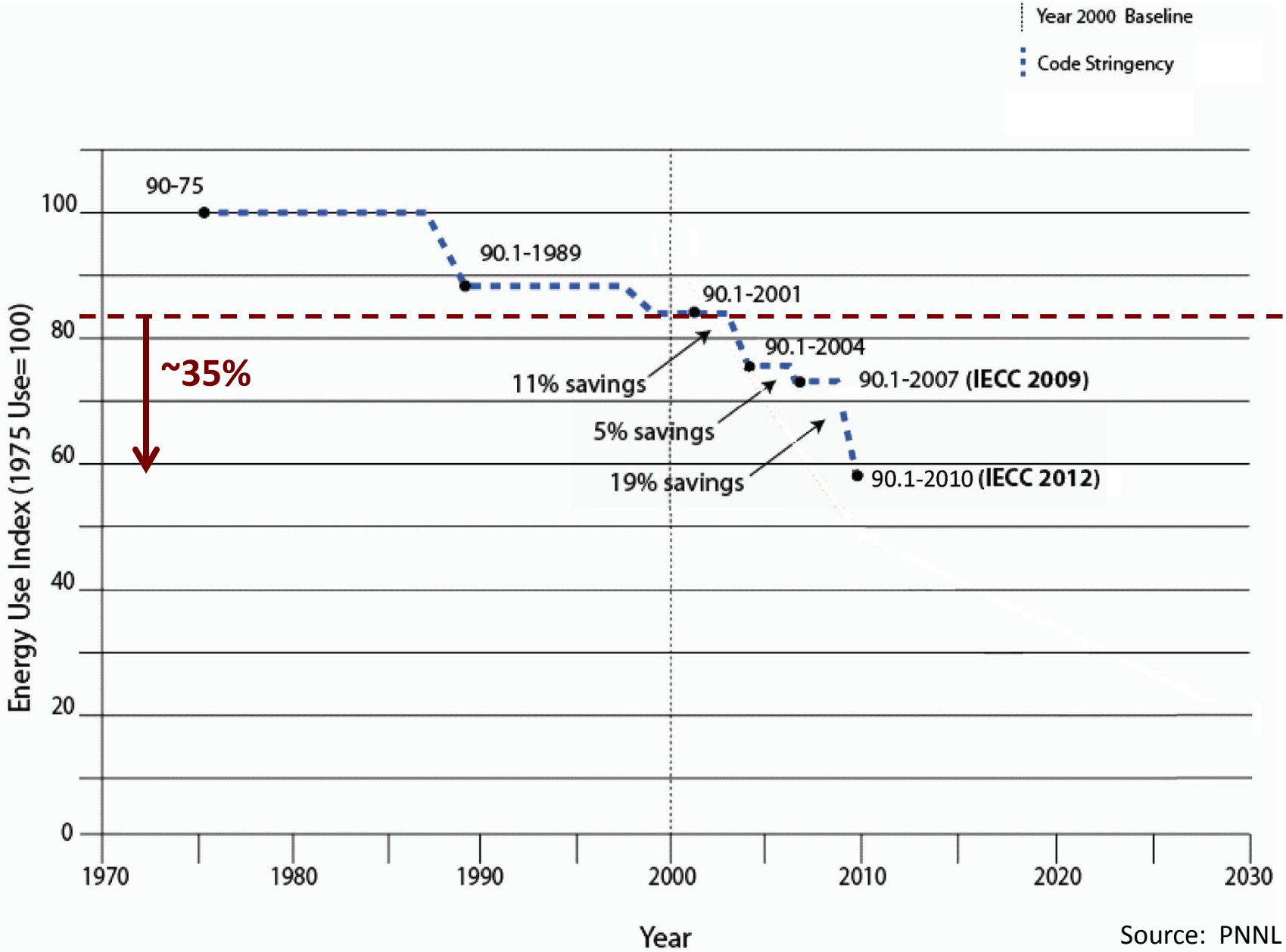

Source: PNNL

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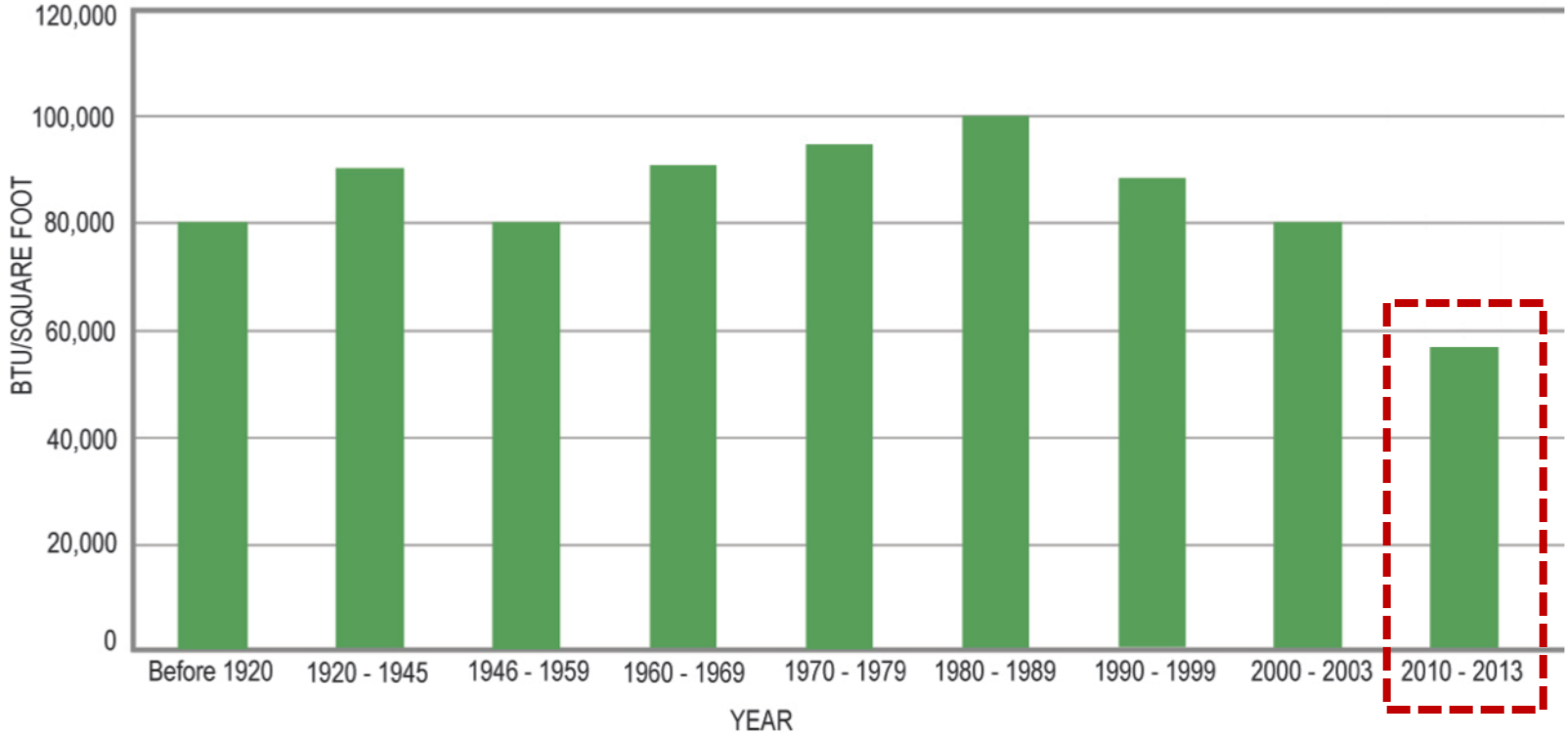
Commercial Building Performance by Vintage



Source: Energy Information Administration, 2003
Published in *The City in 2050: Creating Blueprints for Change*; Urban Land Institute

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Limitations in Using New Construction Tools

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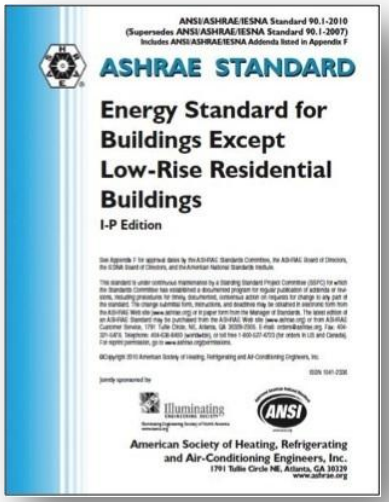
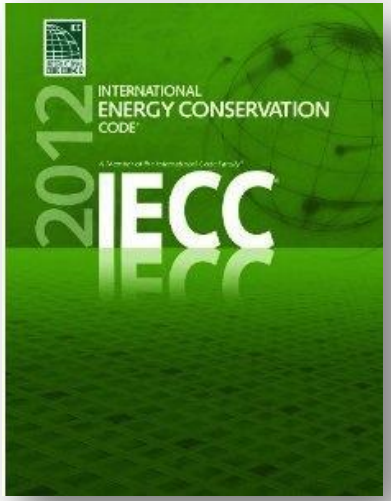
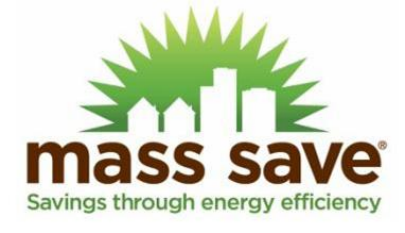
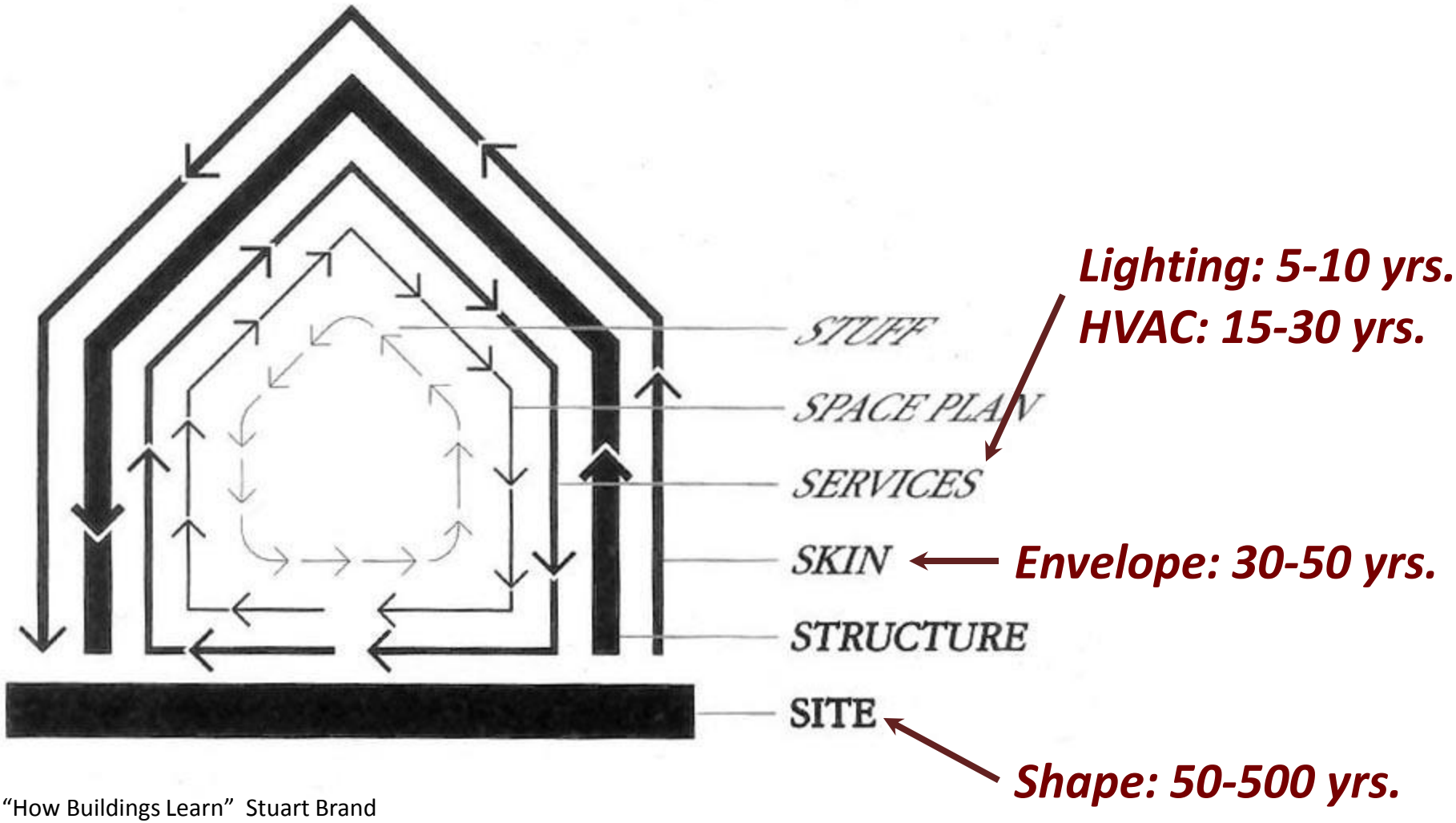
Code and Above Code







"Every Existing Building Was a New Building"



"How Buildings Learn" Stuart Brand

NBI © 2014

Glazing performance – building orientation – cooling efficiency – infiltration – operating hours – climate – weather – occupant density – heating efficiency – duct design – fan size – window area – HVAC control sophistication – building mass – interior shading – occupant habits – data centers – kitchen equipment – lighting power density – filter condition – wall color – lighting controls - furniture configuration – exterior vegetation - operable window use – insolation- glazing orientation – wall insulation – ventilation rate - exposed interior surface characteristics - domestic hot water use – number of computers – copiers and printers – elevators – exterior lighting - occupant gender ratio – elevation – photovoltaics - development density – register location – cooling distribution system – roof insulation – building manager training – cool roof – building surface to volume ratio – building use type – janitorial services – metering strategies – commissioning – structural system – acoustic treatment – slab edge detailing – night setback temperature – ground water temperature – humidity – occupant dress code – lamp replacement strategy – roof slope – daylight controls – sensor calibration – corporate culture – lease terms – utility meter characteristics – parking garage ventilation – HVAC system capacity – number of separate tenants – retail space – age of equipment – ceiling height – heating fuel – transformer capacity – window mullion pattern – terms of maintenance contract – wall thickness – building height – lighting fixture layout – overhangs – thermostat location – exit lighting – private offices – refrigerators – solar hot water – utility meter – load diversity

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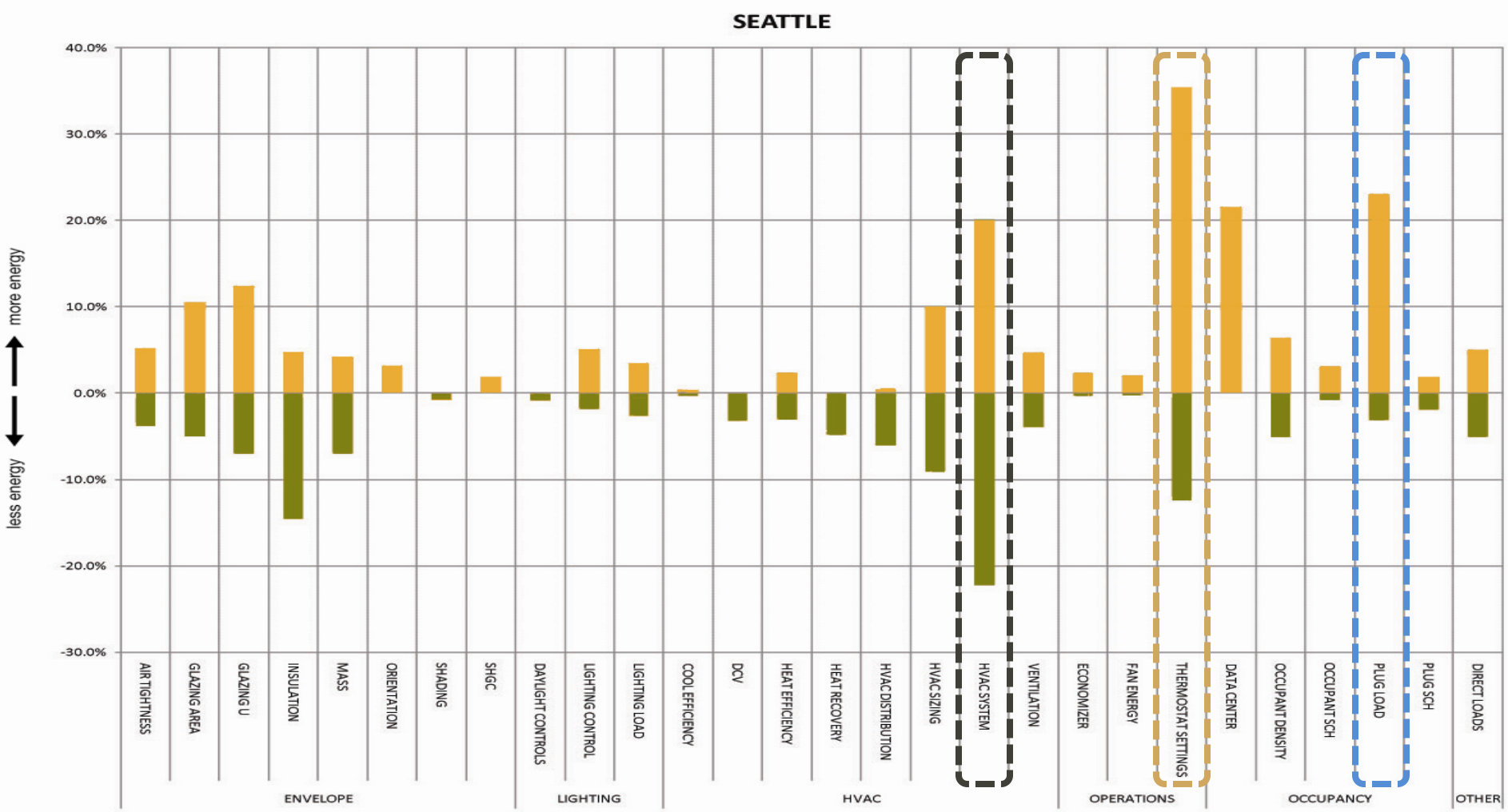
Gaps: Unregulated Factors and Loads

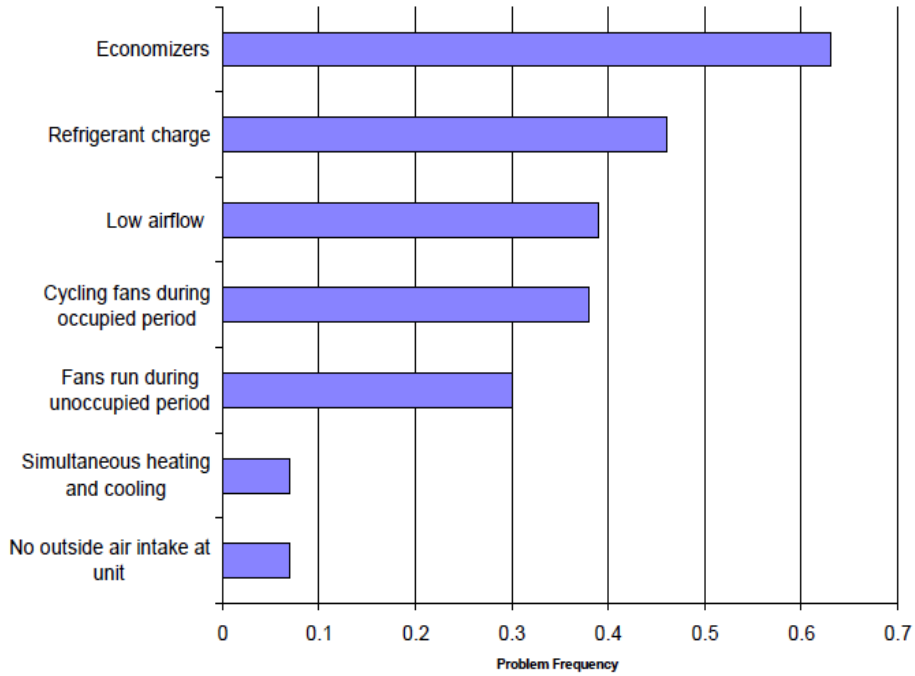
Comparing the Impact of **Design**, **Operation**, and **Tenant Behavior** on Building Energy Performance



Gaps: Post-Occupancy

Figure 4. Frequency of Problems Observed in PIER Study

This figure shows the frequency of several of the common problems observed in the PIER study behind this Design Guide.



From *Small HVAC System Design Guide* by Pete Jacobs

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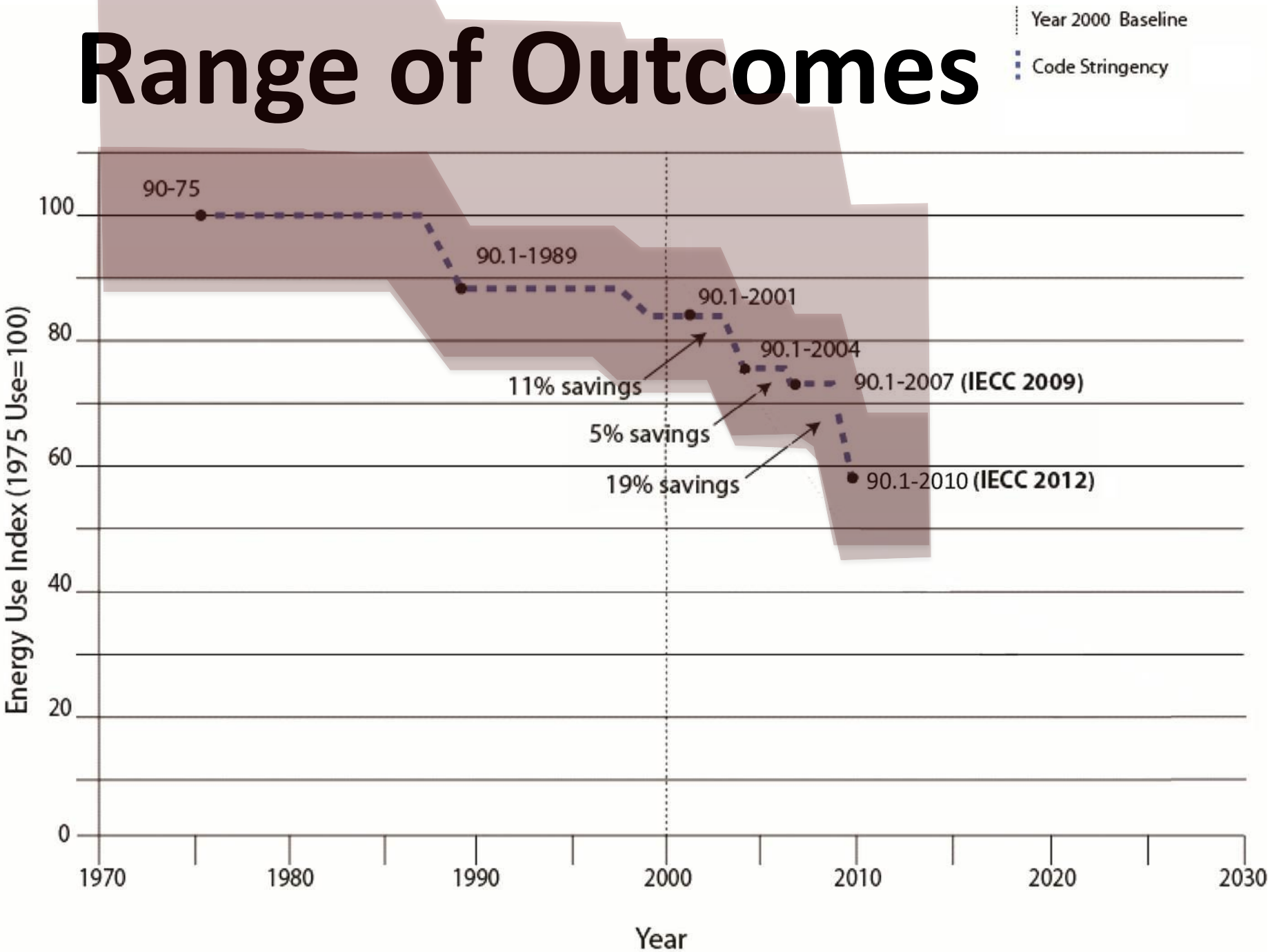
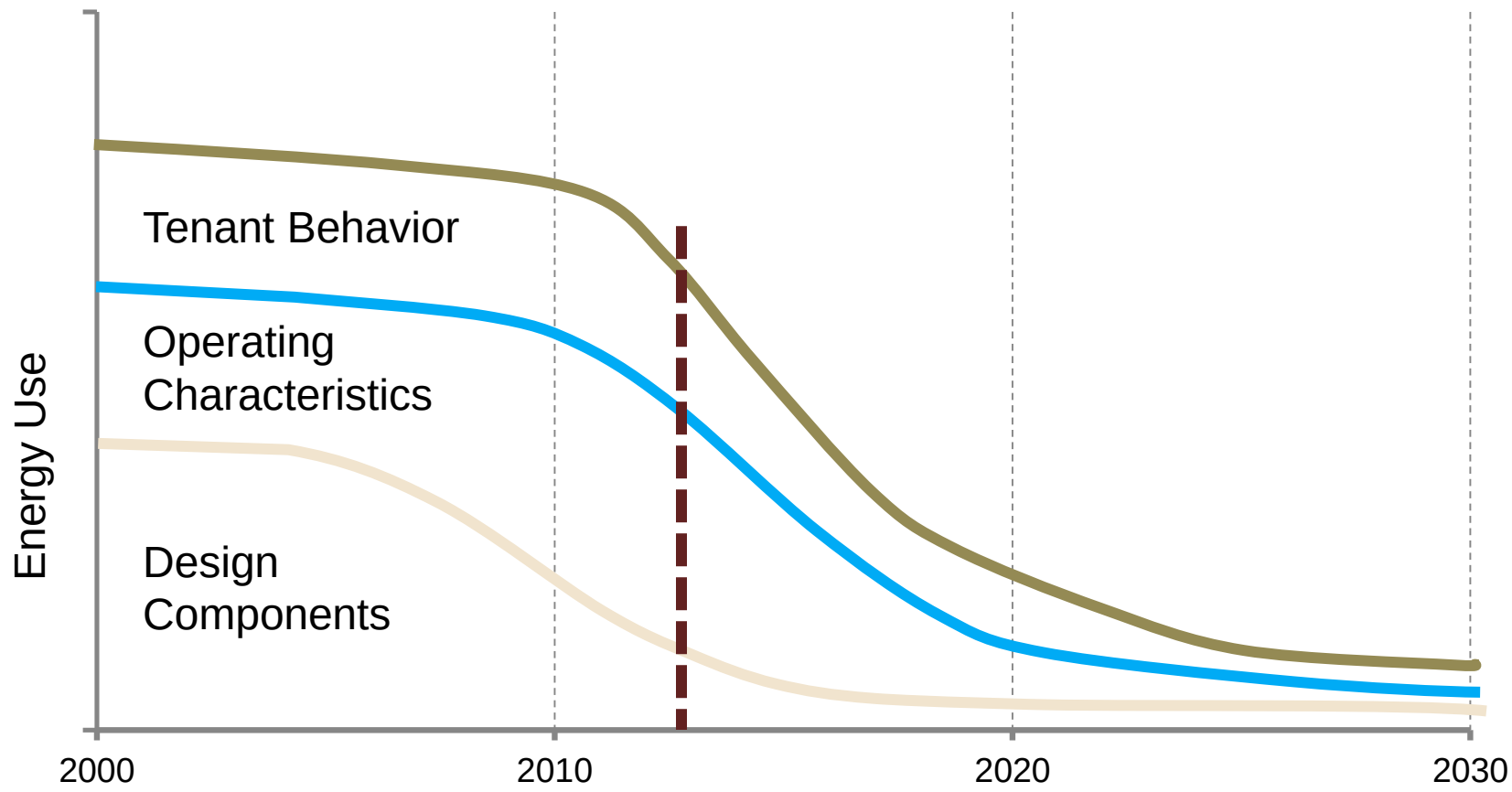
Range of Outcomes



Components of Energy Outcomes



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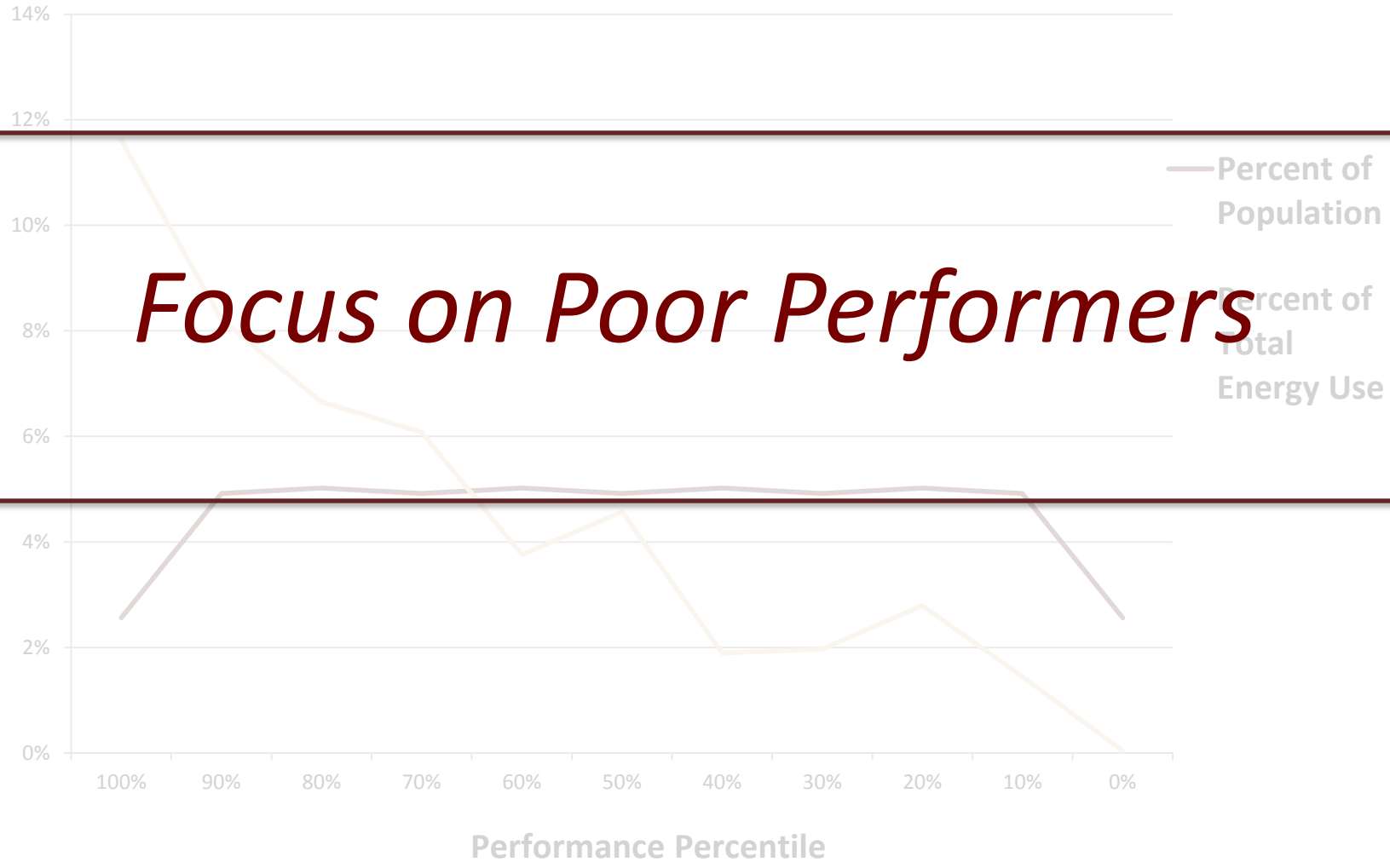
Focus on Poor Performers



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Worse Performance = Better ROI

Same Cost

Greater Savings

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Worse Performance = More Energy Saved

Hybrid

51 MPG

20% Improvement =

61 MPG –OR–

38 Gallons per Year

Old Pick-up

12 MPG

20% Improvement =

14.4 MPG –OR–

167 Gallons per Year

End of Service Life Opportunity

Poor Performers Have Outsized Impact

PUBID8	SQFT8	SQFTC8	YRCONC8	PBA8	ELUSED8	NGUSED8	FKUSED8	PRUSED8	STUSED8	HWUSED8	ADJWT8	STRATUM	PAIR8	HDD658	CDD658	MFUSED8	MFBTU8	MFEXP8
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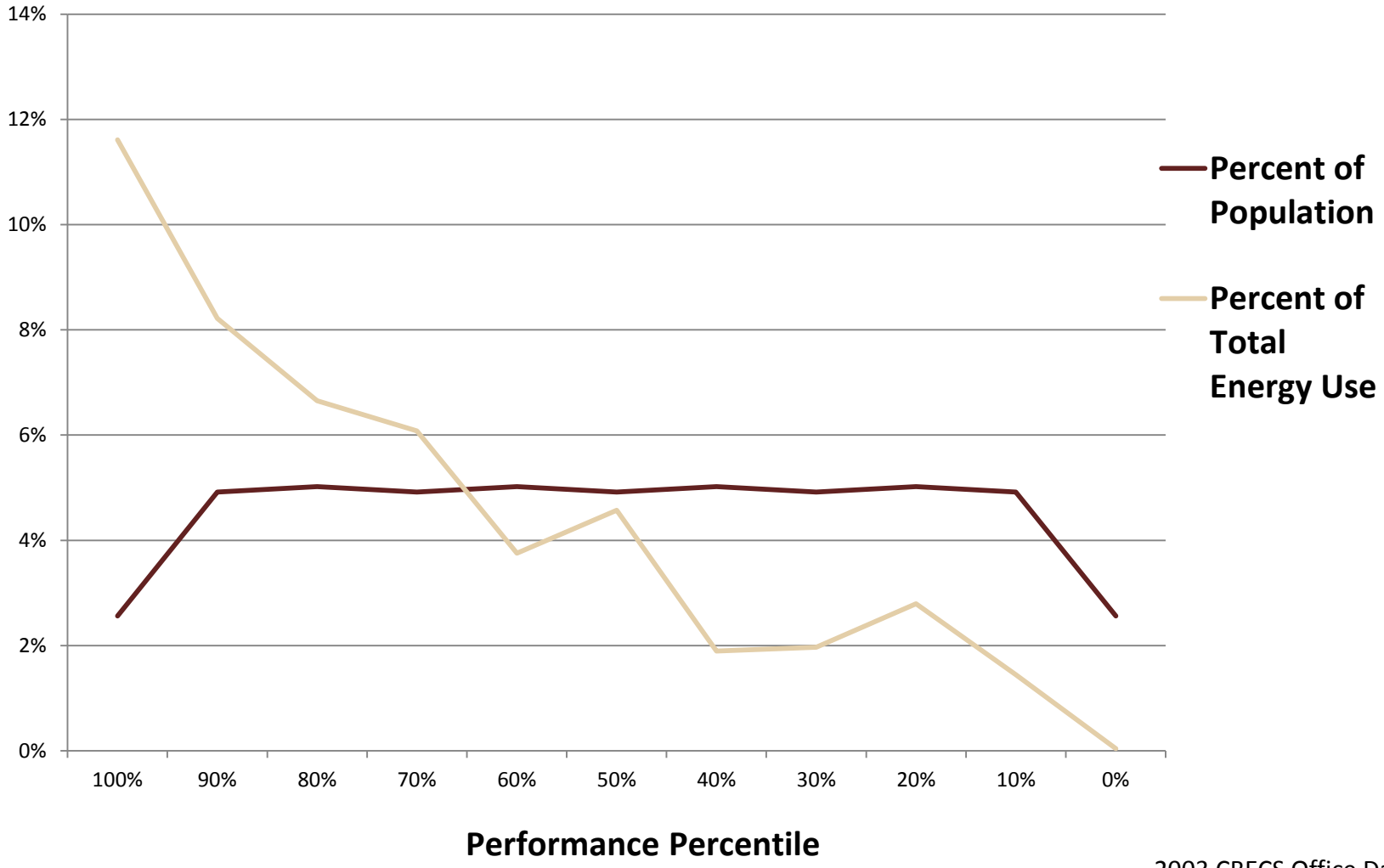
Commercial Building Energy Consumption Survey (2003)

Poor Performers Have Outsized Impact



2003 CBECS Office Data

NBI © 2014

The Power of Poor Performers

Thought Experiment: Three Scenarios

1. Improve the performance of new buildings by 20% for three years
2. Set a minimum performance standard (99th percentile) below which no building may fall
3. Do deep retrofits (20% improvement) on the bottom quartile of buildings

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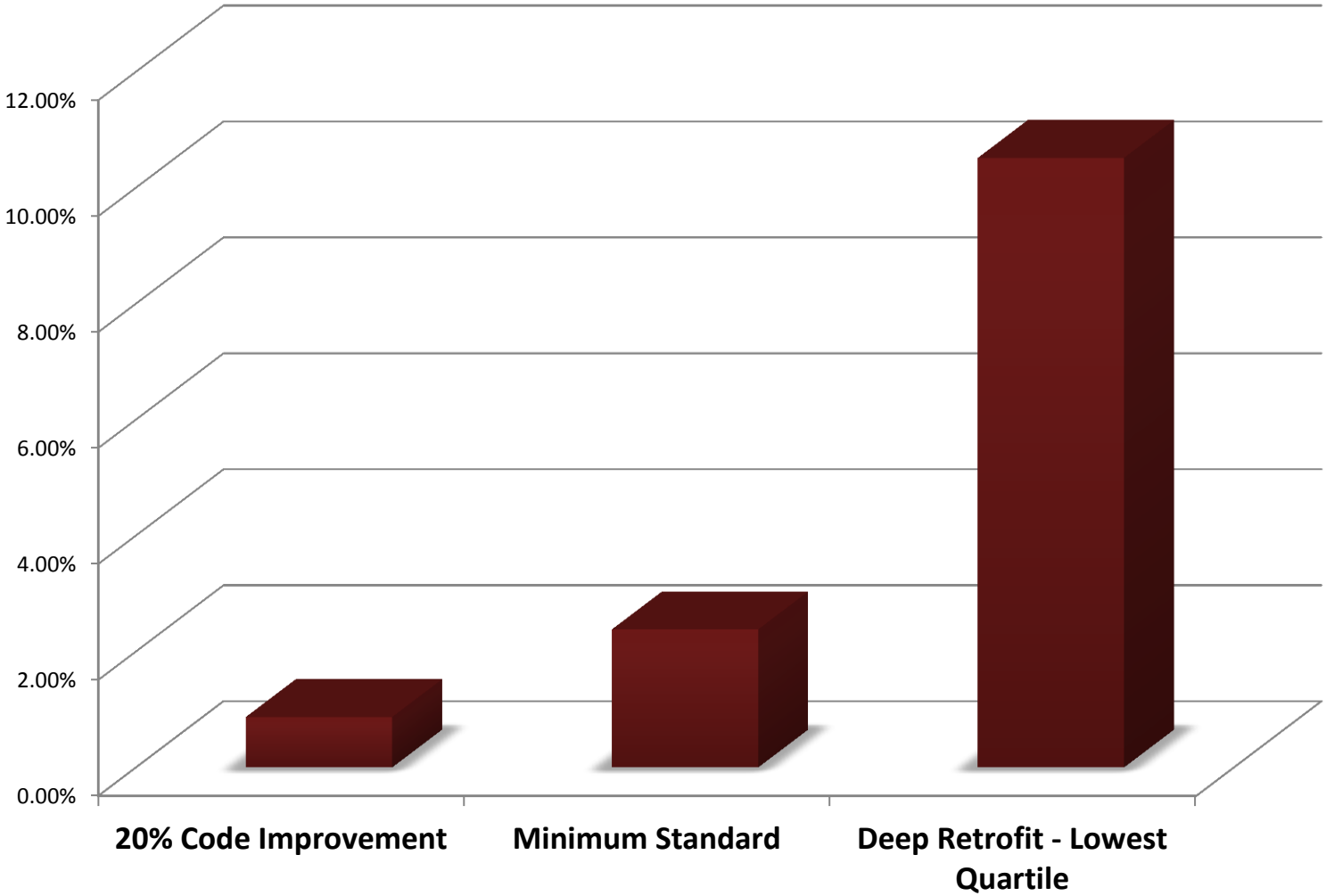
The Power of Poor Performers



2003 CBECS Office Data

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Community Building Renewal Public Building Portfolio Pilot

CBR Pilot Participants Receive:

- Technical assistance with data collection, repository, analysis and "contextualization"
- Technical assistance with identifying and setting performance targets
- Assistance evaluating the city's existing resources, policies and tools
- A comprehensive set of tools to be used to improve the energy efficiency of poor performing buildings
- Assistance with crafting an ongoing policy for using actual energy performance to make energy efficiency decisions on a portfolio-wide basis

NBI © 2014

Community Building Renewal

A New Energy Policy for Public Building Portfolios

For more information, contact:

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SEE Action

STATE & LOCAL ENERGY EFFICIENCY ACTION NETWORK

Greater Minneapolis Kilowatt Crackdown

Sheila Miller

Building Owners and Managers Association, Greater Minneapolis

This information was developed as a product of the State and Local Energy Efficiency Action Network (SEE Action), facilitated by the U.S. Department of Energy/U.S. Environmental Protection Agency. Content does not imply an endorsement by individuals or organizations that are part of SEE Action working groups, or reflect the views, policies, or otherwise of the federal government.

KILOWATT CRACKDOWN

BOMA Greater Minneapolis

PROVIDING ADVOCACY AND EDUCATION FOR COMMERCIAL REAL ESTATE

KILOWATT CRACKDOWN

One of our efforts to keep BOMA on the leading edge of meaningful, voluntary energy conservation efforts for commercial real estate.

BOMA Greater Minneapolis

PROVIDING ADVOCACY AND EDUCATION FOR COMMERCIAL REAL ESTATE

Sue Goldstein

Key Account Manager
Xcel Energy

2010 Chair of BOMA Education Committee

THE BUILDING PERFORMANCE PARTNERSHIP
KILOWATT CRACKDOWN

BOMA Seattle King County
Where value is built.

BOMA Greater Minneapolis
PROVIDING ADVOCACY AND EDUCATION FOR COMMERCIAL REAL ESTATE

Kilowatt Crackdown Partners

BOMA Greater Minneapolis

Xcel Energy®
RESPONSIBLE BY NATURE®

BOMA Greater Minneapolis
PROVIDING ADVOCACY AND EDUCATION
FOR COMMERCIAL REAL ESTATE

Kilowatt Crackdown Partners

The only Kilowatt Crackdown sponsored by a large investor-owned utility.

Kilowatt Crackdown Partners

BOMA Greater Minneapolis

Xcel Energy®
RESPONSIBLE BY NATURE®

Minneapolis
City of Lakes

Greater Saint Paul
BOMA

SAINT PAUL PORT AUTHORITY
TRILLION BTU
ENERGY EFFICIENCY IMPROVEMENT PROGRAM

BOMA
Greater Minneapolis
PROVIDING ADVOCACY AND EDUCATION
FOR COMMERCIAL REAL ESTATE

Kilowatt Crackdown Goals

- Raise property owners', managers', and engineers' awareness about ways to conserve energy.
- Encourage tenant participation in energy conservation.
- Help buildings save money thereby making the business case for energy conservation.
- Reward people for their good work and make them examples of the possibilities for energy conservation.
- Demonstrate that commercial real estate is engaged and fully committed to energy conservation.

The Premise

- Participation is VOLUNTARY.
- It has to be easy to participate. Property owners, managers and engineers have enough to do keeping their buildings running. We can't pile on the stress.
- A little fun, a little competition helps to encourage participation.
- Having something to show for it – a trophy, a plaque, some news coverage – helps to market their building.

To participate

- BOMA member
- Xcel Energy customer
- At least 30,000 square feet

Logistics

- Contest runs calendar year
- Sign up online through a simple SurveyMonkey form:
  - Building name, address, Xcel Energy account #
  - Building manager contact info
  - Building engineer contact info
  - Building size

Awards

- **Highest Performing Buildings**
  in three categories:
  - < 100,000 square feet
  - 100,000 – 500,000 square feet
  - > 500,000 square feet

Awards

- **Most Valuable Tenant . . .**
  nominated by building manager for a tenant who has shown extraordinary commitment to reducing energy.

Awards

- **Kilowatt Cup . . .**
  awarded to the building in each city that has achieved the most energy savings.

Kilowatt Cup Winners

2012 - Carlson Real Estate

Xcel Energy

- Can help identify potential energy efficiency projects;
- Can help determine which would produce the most energy savings;
- Can help determine payback time;
- Can help identify utility rebates and stimulus funding.

During the year . . .

- BOMA and Xcel Energy provide at least one class or workshop on ways to save energy in commercial buildings.
- BOMA newsletter articles remind participants to be working on their conservation projects.

Awards

- Awards are presented at a special breakfast.
- Only Kilowatt Crackdown participants are invited – along with BOMA leadership and city officials.
- Xcel Energy has traditionally sponsored breakfast.

In 2013

- 110 participants
- Representing nearly 41 million SF commercial space

In 2013

- Saved almost 10 million kilowatt hours of electricity

  = powering 956 homes for one year.

  = almost 7,000 metric tons of CO_2

  = taking 1,448 passenger vehicles off the road.

In 2013

- Participants earned $789,000 in rebates from Xcel Energy.

Since 2010 launch

- Participants have saved 31,850,866 kilowatt hours of energy.
- Participants have earned more than $3M in Xcel Energy rebates.

BOMA Kilowatt Crackdown is supported by Senator Al Franken

Mayor Betsy Hodges
Minneapolis

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Greater Minneapolis
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FOR COMMERCIAL REAL ESTATE

Mayor Chris Coleman
Saint Paul

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Kilowatt Cup

Highest Kilowatt Hours saved per square foot.

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FOR COMMERCIAL REAL ESTATE

Kilowatt Cup Minneapolis

Mercy Healthcare Center

Managed by Cushman & Wakefield / NorthMarq

Saved more than 1,000,000 kilowatt hours of energy

BOMA Greater Minneapolis

PROVIDING ADVOCACY AND EDUCATION FOR COMMERCIAL REAL ESTATE

Kilowatt Cup Winners

2014 - Mercy Healthcare Center

Mercy Healthcare Center . . .

- Installed EMS controls and variable speed drives as part of their HVAC upgrades
- Replaced rooftop units
- Lighting retrofits included lighting redesign, installation of occupancy sensors and exit signs.
- New motors on boiler room and chiller room pumps

Most Valuable Tenants

The IDS Center Green Team

Thom Cowhey (Inland), Lisa McIntyre (Schwebel, Goetz and Sieben, P.A.), Deb Kolar (Inland), Dawn Costa (Lindquist & Vennum, P.L.L.P.), Jackie Sullivan (Gray Plant Mooty), Chong Lee (Merchant & Gould. P.C.), Julie Munneke (Briggs and Morgan, P.A.), Jim Durda (Inland).

We produce press releases and event photos and send them to local media as well as participants for their company newsletters.

BOMA Greater Minneapolis

Greater Saint Paul BOMA

KILOWATT CRACKDOWN

NEWS RELEASE
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(612) 338-8627

April 4, 2014

Record 110 buildings join Kilowatt Crackdown

Contest participants save enough electricity to power more than 650 homes for a year

MINNEAPOLIS – The Building Owners and Managers Associations of Greater Minneapolis and Greater Saint Paul, together with Xcel Energy, today announced the winners of the third annual Kilowatt Crackdown, an energy conservation initiative. Awards were presented at a ceremony yesterday morning by Minneapolis Mayor Betsy Hodges and Saint Paul Mayor Chris Coleman.

Minnesota Senator Al Franken also endorsed the Kilowatt Crackdown, saying, "This year's cold weather makes it all the more clear how important energy efficiency is, especially for buildings, which use over 1/3 of our energy. Retrofitting buildings saves money for owners and tenants, it creates jobs in manufacturing and the building trades, it's good for the environment and it creates better spaces to live and work in."

The year-long Kilowatt Crackdown contest challenged Twin Cities area commercial building owners to improve their buildings' efficiency.

A total of 110 buildings in the Twin Cities participated, representing 41 million square feet of space. Collectively, these companies saved 9.8 million kilowatt-hours of electricity. Using the Environmental Protection Agency's equivalency tool, the savings equate to a reduction of 6,910 metric tons of carbon dioxide, or taking 1,440 vehicles off the road. It's also enough electricity to power more than 650 homes for a year.

"BOMA members are already recognized as industry leaders in sustainable building efforts," said Kevin Lewis, executive director of BOMA Greater Minneapolis. "This is yet another example of forward thinking collaboration to achieve extraordinary energy and cost efficiencies."

"This is an incredible, proven program and opportunity to further leverage expertise and funding sources to create even greater energy savings for our buildings and our tenants," said Pat Skinner, chair of the Greater Saint Paul BOMA board.

Companies implemented changes such as retrofitting lighting, upgrading motors and variable frequency drives, buying higher efficiency heating or cooling equipment and conducting building tune-ups. Xcel Energy distributed roughly $800,000 in rebates.

Xcel Energy provided assistance by helping building managers to determine a list of suggested improvements and locating stimulus funding and rebates to help offset the cost of improvements.

Lessons Learned

- Keep registration process simple. (First year registration process was much lengthier.)
- After registering to participate, participation carries over to the next year unless you opt-out. (Second year participation dropped and we later found out many thought they were still “signed up.”)

Lessons Learned

- **First year participants were tracked through the Energy Star program. We continue to encourage participation in Energy Star, but found that that places the responsibility for measurements on the property owner/engineer.**

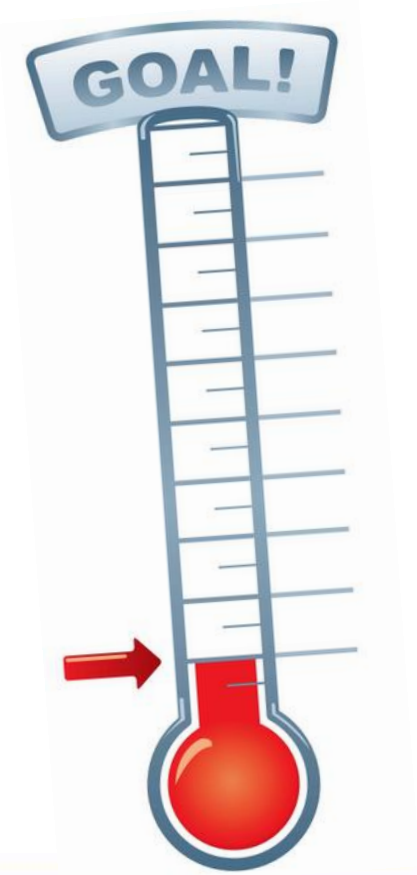
So . . .

Lessons Learned

- **Second year we shifted the work to Xcel Energy. Now they assemble the data based on participation in and results from conservation improvement projects.**

(This is one of the benefits of having the utility partner with us!)

Keeping the Momentum



- **Idea: Use a visual like the fundraiser thermometer to measure cumulative savings throughout the year.**
- **Publicize case studies in real time to show examples of what participants are doing.**

Photos from
2014 Awards Breakfast

BOMA
Greater Minneapolis
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FOR COMMERCIAL REAL ESTATE

Pat Skinner
Unilev Management Corp.
Chair
BOMA Greater St. Paul
Jon Kuskie
Zeller Realty Group
President
BOMA Greater Minneapolis

Dave Sparby
President and CEO
NSP-Minnesota

Kilowatt Cup Minneapolis
Mercy Healthcare Center
Charlie
Kristen

Welcome
KILOWATT
CRACKDOWN

KILOWATT
CRACKDOWN
BOMA
Saint Paul
Xcel Energy
KILOWATT CRACKDOWN 2013 AWARDS
2013

KILOWATT CRACKDOWN

BOMA Greater Minneapolis

PROVIDING ADVOCACY AND EDUCATION FOR COMMERCIAL REAL ESTATE

New Jersey's Pay For Performance Program

Tom Rooney

On Behalf of the New Jersey Clean Energy Program

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New Jersey's Clean Energy PROGRAM™
Your Power to Save
njcleanenergy.com

TRC
Results you can rely on

P4P

Whole Building Approaches for Existing C&I Buildings

Pay for Performance Program

Developing Performance-Based Policies for Commercial Buildings
SEE Action Network - Existing Commercial Buildings Working Group
June 12, 2014

ENERGY STAR PARTNER

www.trcsolutions.com

New Jersey Clean Energy Program

- Introduced in 2001 as part of NJ "Clean Energy Act" of 1999
- Funded from "Societal Benefits Charge" on utility bill
- Administered by the New Jersey Board of Public Utilities
- Provides energy efficiency project opportunities for:
  - Residential
  - Commercial & Industrial *(TRC Energy Services)*
  - Renewable Energy

NJ Clean Energy Program Goals

- **Save** energy and lower operating costs
- **Protect** the environment and lower emissions
- **Change** the business mindset
  - Think high efficiency first
  - Encourage early retirement of equipment
  - Increase effective operations and maintenance
  - Promote renewable energy alternatives

P4P Background

- Program design influenced by NYSERDA Multifamily Performance Program (2007)
- New Jersey Clean Energy Program launched P4P in 2009 – Existing and New Buildings
- New Hampshire Public Utilities Commission launched P4P in 2011 with RGGI funding

Unique Design Features of P4P

- Not equipment-based, all energy efficiency measures are eligible
- Qualified trade ally network via open RFQ process
- Project level cost effectiveness ≥ 10% IRR
- Incentives linked directly to performance
  - $/kWh & $/MMBTU for estimated & actual savings
- Building simulation modeling required
  - M&V is primarily front-loaded
- Post-retrofit performance tracked for all projects

P4P Overview

1. Promote Comprehensive Savings in C&I Buildings
2. Foster Sustained Owner-Partner Relationship
   - ✓ Evaluate Project & Benchmark
   - ✓ Complete ASHRAE Level 3 Audit *(Energy Reduction Plan)*
   - ✓ Oversee Construction
   - ✓ Provide Post-Construction M&V Support
3. Integration with ENERGY STAR

1. Comprehensive Savings

- Require 15% Source Energy Reduction
  - ✓ Incorporates comprehensiveness by design
  - ✓ Promotes operational & retrofit measures
  - ✓ Flexibility allows scope to match building
- Maximum of 50% savings from lighting
- Must include at least two (2) distinct measures

2. Foster Sustained Owner-Partner Relationship

- Develop Partner Network
  - Qualify firms with experience in C&I projects
  - Require Partner involvement – no Partner, no Project
  - Open enrollment of Partners
  - Encourage Teaming

3. Integration with ENERGY STAR

- Align with an industry standard
  - Well known vehicle for benchmarking
  - Third party, accessible, transparent
  - Promotes ongoing benchmarking
  - Potential for recognition & portfolio-level expansion
  - Building Performance with ENERGY STAR link

BUILDING PERFORMANCE WITH ENERGY STAR

Working to deliver whole-building energy performance that saves money and helps protect the environment.

P4P Program Process

Incentive 1

- Development of Energy Reduction Plan (ERP)

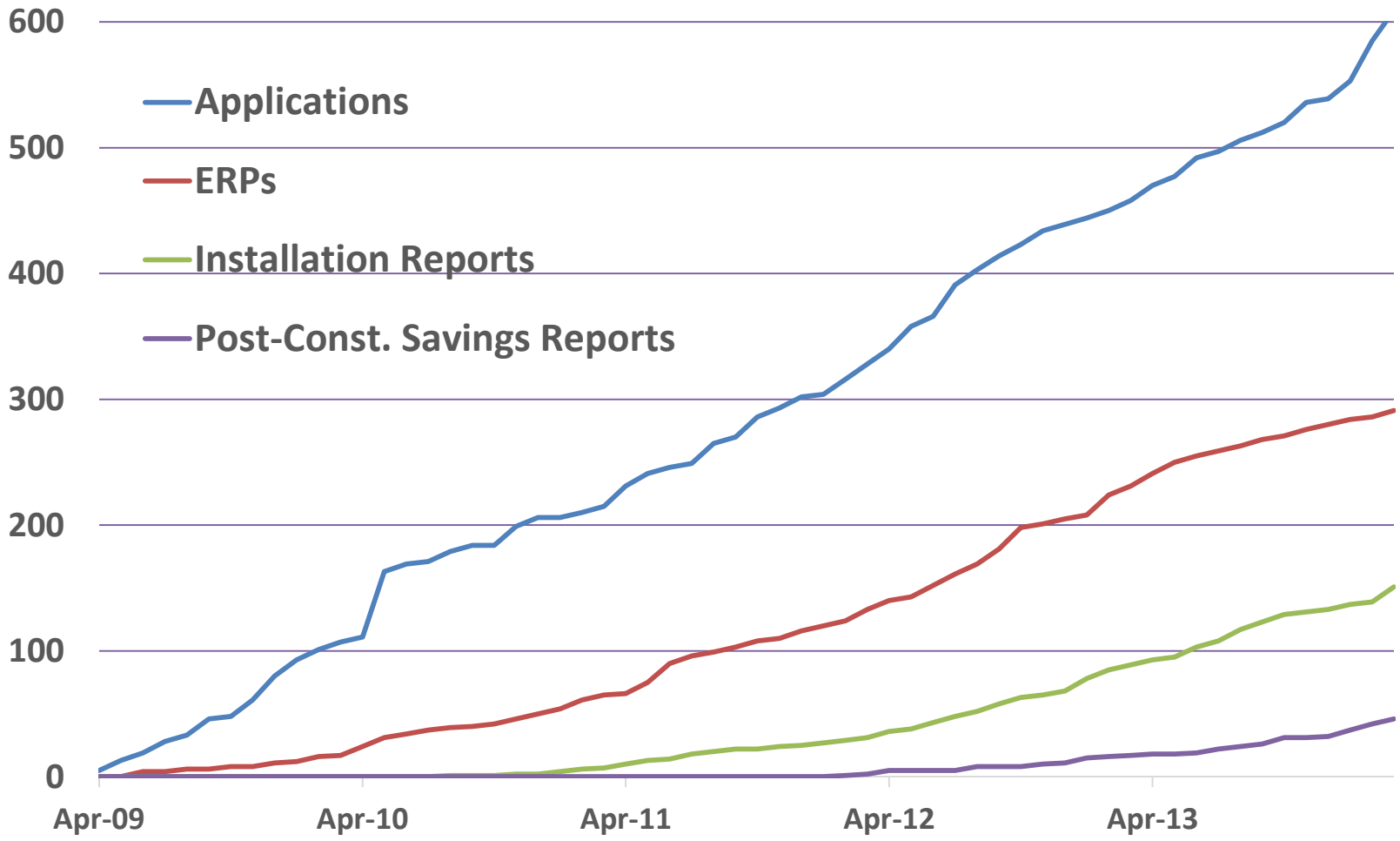
Incentive 2

- Implementation of Recommended Measures

Incentive 3

- Post Construction Verification of Savings (Calibrated Simulation)

Historic Program Uptake



P4P Program Stats – NJ & NH

- 300 Energy Reduction Plans Submitted
- 214 ERP's Approved ***(71%)***
- 154 Projects Completed ***(51%)***
- 47 Projects Submitted for Incentive 3 ***(16%)***

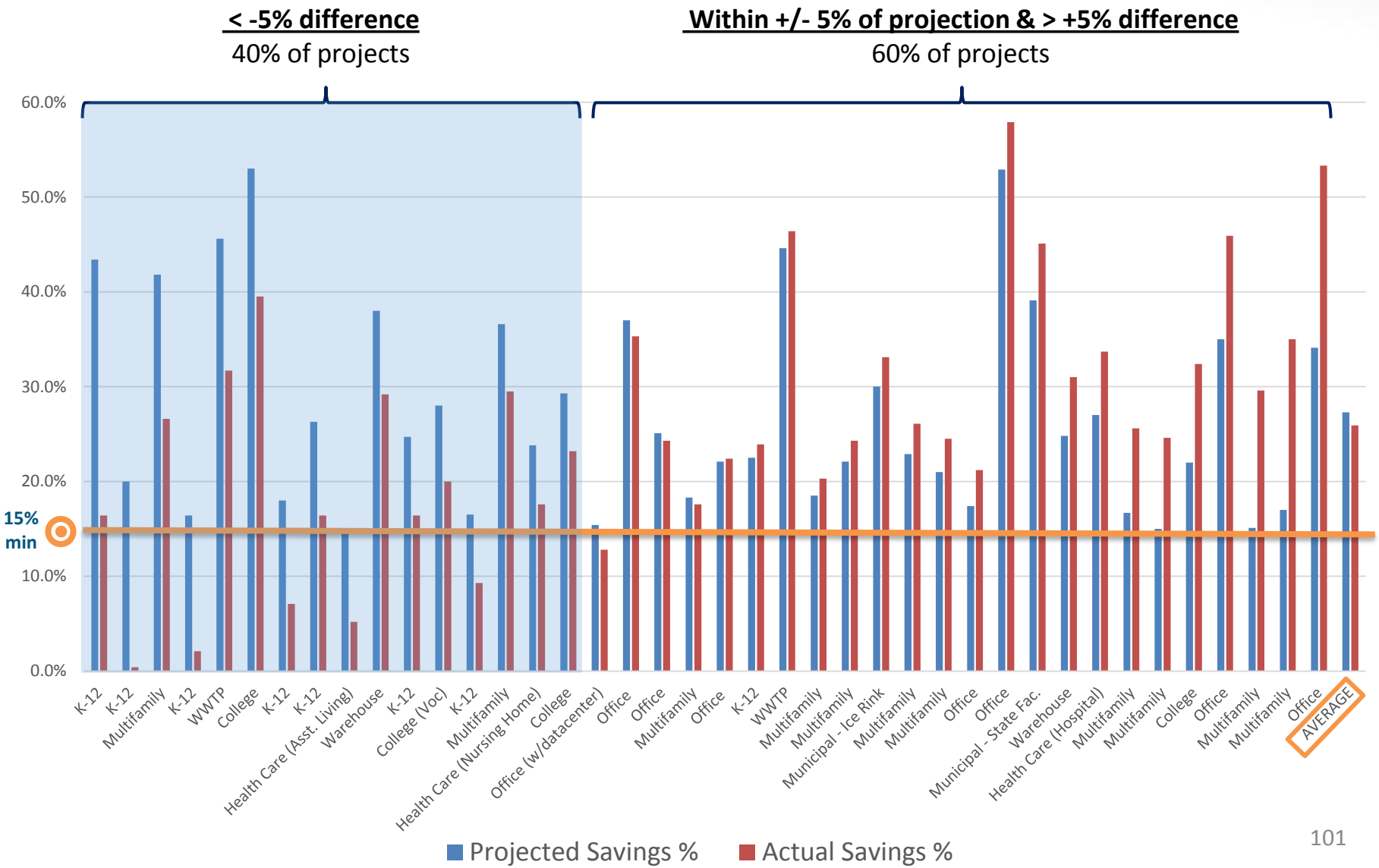
<u>Savings to date</u>

- 120,000 MWH
- 875,000 MMBTU

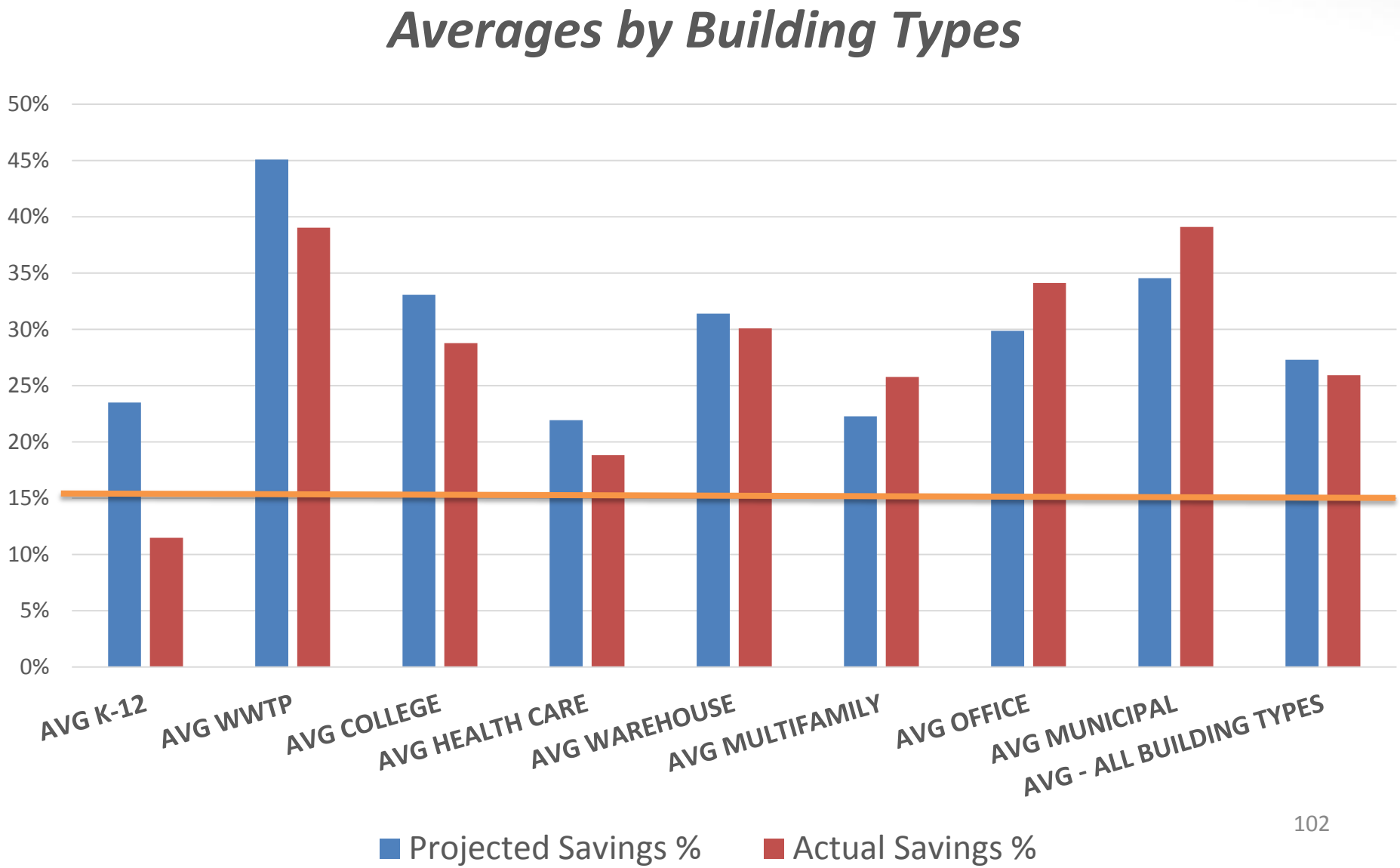
P4P Program Results – Post-Construction

- Forty (40) Projects Reached Incentive 3
  - **87%** achieved the 15% minimum
  - **25%** exceeded projections
  - **40%** fell short of projections
- Average savings projection of **27%**
- Average achieved savings of **26%**

P4P Program Results



P4P Program Results



Opportunities

- Ideal offering for progressive owners & Partners
- Leverages high cost of customer engagement
- Expands & strengthens market for EE firms
- Encourages innovative solutions to energy efficiency in C&I buildings
- Good complement of full suite of traditional prescriptive & custom options

Challenges

- Steep learning curve associated with building simulation requirement
- Long project cycle with large, complex projects
- Definition of baseline: existing conditions or code
- Requires substantial customer investment

P4P Evolution

- Sector-based Approach
  - Customize tools to address unique features of sectors (K-12, Office, Multifamily, …)
- Alternative Option – no modeling required
  - Base all incentives on verified savings
- Analytics integration – enhanced benchmarking
- Continuous energy monitoring
- Integration of loan component

Thank you

Questions?

Tom Rooney
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TRC Energy Services

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www.trcsolutions.com

SEE Action

STATE & LOCAL ENERGY EFFICIENCY ACTION NETWORK

Questions

SEE Action
STATE & LOCAL ENERGY EFFICIENCY ACTION NETWORK

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Find out more by visiting the **SEE Action Existing Commercial Buildings Working Group** webpage.