Developing Performance-Based Policies for Commercial Buildings

June 12, 2014

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

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.
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

www.seeaction.energy.gov
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
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

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

Existing Commercial Buildings Working Group
May 2014
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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

www.seeaction.energy.gov
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
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**
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
Building Sector Energy Consumption

**Buildings 49%**
(46.9 QBtu)

**Industry 22.7%**
(21.7 QBtu)

**Transportation 28.2%**
(27.0 QBtu)

U.S. Energy Consumption by Sector

Source: ©2010 2030, Inc. / Architecture 2030. All Rights Reserved.
Building Sector Carbon Emissions

Source: Architecture 2030

NBI © 2014
Focus on the Whole Portfolio of Buildings

Source: US Energy Information Association
Source: US Energy Information Association
Commercial Building Performance by Vintage

Source: Energy Information Administration, 2003
Published in *The City in 2050: Creating Blueprints for Change*; Urban Land Institute
~35%
Commercial Building Performance by Vintage

Source: Energy Information Administration, 2003
Published in The City in 2050: Creating Blueprints for Change; Urban Land Institute
Limitations in Using New Construction Tools
Code and Above Code
“Every Existing Building Was a New Building”

“How Buildings Learn” Stuart Brand
Gaps: Unregulated Factors and Loads
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
Components of Energy Outcomes

- Tenant Behavior
- Operating Characteristics
- Design Components

Energy Use

- 2000
- 2010
- 2020
- 2030
Focus on Poor Performers

Percent of Population

Percent of Total Energy Use

Performance Percentile
Worse Performance = Better ROI

Same Cost

Greater Savings
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

**Commercial Building Energy Consumption Survey (2003)**

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Poor Performers Have Outsized Impact

Performance Percentile

2003 CB ECS Office Data
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
The Power of Poor Performers

2003 CBECs Office Data

20% Code Improvement | Minimum Standard | Deep Retrofit - Lowest Quartile

203 CBECs Office Data
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
Community Building Renewal
A New Energy Policy for Public Building Portfolios

For more information, contact:
Ken Baker
kbaker@neea.org
Greater Minneapolis Kilowatt Crackdown

Sheila Miller
Building Owners and Managers Association, Greater Minneapolis

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One of our efforts to keep BOMA on the leading edge of meaningful, voluntary energy conservation efforts for commercial real estate.
Sue Goldstein
Key Account Manager
Xcel Energy

2010 Chair of BOMA
Education Committee
Kilowatt Crackdown Partners

The only Kilowatt Crackdown sponsored by a large investor-owned utility.
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 CO2
  = 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.
Mayor Betsy Hodges
Minneapolis
Mayor Chris Coleman
Saint Paul
Kilowatt Cup

Highest Kilowatt Hours saved per square foot.
Kilowatt Cup Minneapolis

Mercy Healthcare Center
Managed by Cushman & Wakefield / NorthMarq

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

**News Release**

**KILOWATT CRACKDOWN**

April 4, 2014

**Record 110 buildings join Kilowatt Crackdown**

Contest participants save enough electricity to power more than 450 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 8,810 metric tons of carbon dioxide, or taking 1,441 vehicles off the road. It’s also enough electricity to power more than 550 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
New Jersey’s Pay For Performance Program

Tom Rooney
On Behalf of the New Jersey Clean Energy Program

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.
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
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 $\geq 10\%$ IRR
- Incentives linked directly to performance
  - $/\text{kWh}$ & $/\text{MMBTU}$ 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
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)
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%)

Savings to date
- 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

< -5% difference
40% of projects

Within +/- 5% of projection & > +5% difference
60% of projects

Projected Savings %  Actual Savings %
P4P Program Results

Averages by Building Types

- AVG K-12
- AVG WWTP
- AVG COLLEGE
- AVG HEALTH CARE
- AVG WAREHOUSE
- AVG MULTIFAMILY
- AVG OFFICE
- AVG MUNICIPAL
- AVG - ALL BUILDING TYPES

Projected Savings %
Actual Savings %
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
Questions?

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Questions
Questions?

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