Success Stories from the Better Buildings Challenge

Wednesday, November 16, 2016
Agenda

10:00   Welcome & Introductions
10:05   Speaker Presentations
10:45   Q&A
11:00   Adjourn
Speakers

Cindy Zhu
Fellow
U.S. DOE

Joyce Mihalik
VP Integrative Design Services
Forest City Realty Trust

Tabitha A. Scott
SVP
Balfour Beatty Investments
Cost effective opportunities for energy efficiency

U.S. spends $600 billion each year to power homes, plants, & buildings

- Great opportunities in residential, commercial and industrial sectors
- 20% + savings is average
- Other benefits: Jobs, Environment, Competitiveness

BUT persistent barriers exist….
- Efficiency not included as corporate decision making; not integrated into business planning
- Lack of senior management buy-in
- Lack of information; need unbiased information
- High hurdle rates
- No ability to engage in ESCO financing
- Split incentives /tenant-employee behaviors at odds with efficiency goals
- Not enough/qualified workforce
Better Buildings®
U.S. DEPARTMENT OF ENERGY

Better Buildings Challenge

Better Buildings Alliance
Better Buildings, Better Plants
Better Buildings Accelerators
Better Buildings Residential
Superior Energy Performance

Developing a Skilled Clean Energy Workforce
Better Buildings Workforce Guidelines

MARKET LEADERSHIP

BUILDING PERFORMANCE DATABASE
BUILDING ENERGY DATA EXCHANGE SPECIFICATION
NEW FINANCING SOLUTIONS
BUILDING ENERGY ASSET SCORING TOOL
HOME ENERGY SCORE
APPRAISAL FOUNDATION MEMORANDUM OF UNDERSTANDING

WORKFORCE DEVELOPMENT

LEADING BY EXAMPLE IN THE FEDERAL GOVERNMENT
NEW EXECUTIVE ORDER
PRESIDENT’S PERFORMANCE CONTRACTING CHALLENGE
DOE LEADERSHIP

FEDERAL LEADERSHIP

Making Energy Efficiency Investment Easier

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Working with market leaders

Goals:
Make buildings & multifamily housing 20%+ more efficient in 10 years
Save money $80B+
Create American jobs
Improve energy security
Mitigate impacts of climate change

How:
✓ Leadership … set public goal (least 20%/10 years) and share…
✓ Results …. Showcase projects, annual savings
✓ Transparency … Facility level data
✓ Best Practice Models …. What has worked for partner
✓ Recognition …. As national leader
✓ Catalyzing Action … Together
Better Buildings Solution Center – launched in May
energy.gov/bbsc

200+ showcase projects
- Large and small buildings
- All sectors
- Specific building types such as schools, hospitals, hotels, grocery stores, universities, civic centers, libraries, offices and labs

100+ implementation models (playbooks)
- Overcome barriers: finance, data, energy management, staff training, community and customer outreach, partnering with utilities, and more
- Multi-faceted and applicable across sectors

1,000 case studies, reports, calculators and more
Partners on track to meet goals
- 300+ partners; 4B ft², 1000+ plants
- $5.5 in Financing via Allies
- $1.3 billion in savings since 2011
- 2.3 billion gallons in water savings
- 2%+ average annual improvement in energy intensity
- 35 Goal achievers

New Partners: Wendy’s, University of California-Berkeley, LA Unified School District, Anthem, Bard College

New Better Buildings Accelerators announced at 2016 Summit
- Combined Heat and Power for resiliency
- Clean Energy for Low Income Communities
- Wastewater Infrastructure
More partners + more solutions = greater impact
Multifamily Sector Snapshot

110 Partners
- 41 Public Housing Authorities
- 54 Affordable Housing
- 6 Market Rate
- 9 Mixed Sector (MR + Affordable)
- 14 Implementation Models
- 33 Showcase Buildings

Playbook Topic Examples
- Getting the Most out of Energy Performance Contracts
- Integrating Resident Health into Green Retrofits
- Replicable and Scalable Near-Zero Net Energy Retrofits for Low Income Housing
- Self-Managed Energy Performance Contracting
- Smart Meter Resident Energy Savings Program
- A Model for Bundling Projects, Creating Savings and Cutting Administrative Costs
- Energy Benchmarking Program
- Accessing Tenant Utility Data in Triple-Net Leased Buildings
- Centralized Energy Management and Capital Set-Aside Fund
Federal Initiatives and Resources

- HUD’s Office of Multifamily Housing Programs
  - Management Fee Add-on
  - Pay for Success
  - MIP Reduction
  - Expedited Reserve for Replacement processing
  - Project-Assisted Clean Energy (PACE) financing
  - Project Rental Assistance Contracts (PRAC) for Section 202 and 811 properties
- HUD’s Office of Public and Indian Housing
  - Performance Contracts (EPC)

The Denver Housing Authority achieved 14% in energy savings and $16,000 in cost savings by conducting a self-managed EPC at Barney Ford Apartments (pictured).
Better Buildings Challenge
Forest City Realty Trust
Joyce Mihalik
VP – Design Services
Our assets are located in core markets characterized by great urban centers with strong demographics and superior growth potential.

Core markets include those mentioned in the map and regional malls outside of these markets.
BUILDING NEIGHBORHOODS ACROSS AMERICA – THE PARTNER OF CHOICE TO CREATE SPACE TO WORK, LIVE, SHOP AND PLAY
WE MAKE THE BUILDING WORK
Better Buildings Challenge Partner since 2012
Two Showcase Projects
SouthBay Galleria – 25% reduction in energy use
Independence Wellness Center – major green renovation

Two Implementation Models
Energy Management Organizational Model
Technology Implementation Model

Lighting Challenge Participant

FOREST CITY REALTY TRUST COMMERCIAL PARTNER

Implementation Model: Introducing New Technology

ORGANIZATION TYPE
Commercial Real Estate

BARRIER
Adopting new energy efficiency technologies on portfolio-wide basis

SOLUTION
The Integrative Design Services group researches and vets new market offerings to pilot, monitor, and bring to scale

OUTCOME
New technologies improve building performance, enhance service delivery, and strengthen the company’s financial position
Better Buildings Challenge Results

- EUI Improvement since 2010 baselines
- 5% improvement in whole buildings registered in the Better Buildings Challenge
- 9% improvement in comparative portfolio, including buildings with combination of landlord and tenant controlled spaces
DOE Better Buildings Opportunities

Benefits

• Firm Corporate commitment to sustainability and operating improvement goals

• Access to some of the best minds in the tech, efficiency and real estate sectors through direct collaboration or research and documentation

Challenges

• Changing portfolio

• Managing improvement in buildings with a combination of landlord and tenant controlled spaces

• Early commitment to comprehensive data review and cleanup
Strategy Evolution
1) Converting Energy Data from Static to Dynamic

**Current State**
- Monthly data
- **12 points per year**

- Monthly report to C-Level regarding goals and performance
- Quick Snapshots for Budgeting

**Future State**
- 15-minute interval data
- **35,040 points per year**

- Training operators on continuous commissioning
- Building diagnostics
- Laser strike for Cap-Ex projects
Strategy Evolution

2) Technology Implementation Intensive

**Past State** Strategize around major energy use and recommend Cap-Ex projects for portfolio

**Future State** Concentrate on broad scale initiatives of proven technologies

<table>
<thead>
<tr>
<th>PROJECT DRIVERS</th>
<th>Projects</th>
<th>COST</th>
<th>Savings</th>
<th>ROI</th>
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<tbody>
<tr>
<td>Energy Efficiency Investment (M09) &amp; (M03)</td>
<td>103</td>
<td>$8,361,489</td>
<td>$1,122,429</td>
<td>13%</td>
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<tr>
<td>Air Distribution</td>
<td>9</td>
<td>$1,100,606</td>
<td>$99,575</td>
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<td>Appliances</td>
<td>1</td>
<td>$190,000</td>
<td>$18,240</td>
<td>10%</td>
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<td>Chillers</td>
<td>2</td>
<td>$172,000</td>
<td>$10,997</td>
<td>6%</td>
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<tr>
<td>Controls</td>
<td>14</td>
<td>$497,100</td>
<td>$213,190</td>
<td>43%</td>
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<tr>
<td>Cooling Towers</td>
<td>2</td>
<td>$762,400</td>
<td>$76,240</td>
<td>10%</td>
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<tr>
<td>HW Boilers</td>
<td>4</td>
<td>$516,006</td>
<td>$24,671</td>
<td>5%</td>
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<tr>
<td>Insulation</td>
<td>1</td>
<td>$2,000</td>
<td>$1,000</td>
<td>50%</td>
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<tr>
<td>Lighting</td>
<td>25</td>
<td>$1,896,268</td>
<td>$488,287</td>
<td>26%</td>
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<tr>
<td>Lighting Controls</td>
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<td>$8,000</td>
<td>$4,781</td>
<td>60%</td>
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<td>Mechanical Pumps</td>
<td>1</td>
<td>$8,000</td>
<td>$142</td>
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<td>Other</td>
<td>1</td>
<td>$36,000</td>
<td>$20,000</td>
<td>56%</td>
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<tr>
<td>Package A/C Units</td>
<td>23</td>
<td>$527,667</td>
<td>$47,604</td>
<td>9%</td>
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<tr>
<td>RTUs</td>
<td>6</td>
<td>$567,622</td>
<td>$14,621</td>
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<td>Unit Hot Water Heaters</td>
<td>1</td>
<td>$8,000</td>
<td>$283</td>
<td>4%</td>
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<tr>
<td>VFD</td>
<td>2</td>
<td>$80,000</td>
<td>$7,242</td>
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<td>Water Conservation</td>
<td>5</td>
<td>$24,700</td>
<td>$42,811</td>
<td>173%</td>
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<tr>
<td>Windows</td>
<td>5</td>
<td>$1,965,120</td>
<td>$52,745</td>
<td>3%</td>
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**TOTALS ($$ in Millions)** 188 $11,992,283 $1,122,429

Technologies implemented on a broad scale:
- Variable Supply Technologies (VRF, VFDs) (five projects, 20+% return)
- Smart Irrigation Drip Control (five projects, 20% savings)
- Building Diagnostics Platforms (ten projects, over $100,000 annual savings identified to date)
- LED Luminaires (standard for all future lighting projects, both retrofit and new development)
- Electrical Vehicle Charging Stations
- Integrated Lock Systems
- Hands Free Toll Tag Technology
Strategy Evolution
3) Embedded Design

**Past State**  Cost-Add Conversations

- Smart Thermostats
- EnergyStar Appliances & Equipment
- Vehicle Charging Solutions
- Submetering
- Integrated Security

**Future State**  Embedded Design

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Better Buildings Challenge

Balfour Beatty Communities

Tabitha A. Scott, SVP Innovation & Sustainability
Balfour Beatty Communities

- One of the largest U.S. residential real estate companies with operations and capabilities focused on the acquisition, management and renovation of multifamily assets
- Mix of military, multifamily and student communities
- Customized property management and development solutions focused on superior customer service
BBC Current Portfolio:
- 80 Communities
- 51,000 units
- 200,000 residents
- $560m annual revenues
- $5bn portfolio value
Recent Highlights

• Ranked the 24th largest property manager and 25th property owner in the US
• Over 20 MW of solar on community rooftops
• Earned ‘Superior Company’ national award from SatisFacts for resident satisfaction
• Earned 50+ awards for resident satisfaction across Army, Navy and Air Force portfolios
• Awarded 50 college scholarships to residents across the portfolio
Why Net Zero – The Business Case

- Reduced Operating Costs
- Increased Energy Security
- Enhanced Community Sustainability
- Client Driven Standard
- Army Partner for Housing at:
  - 2 “Net Zero Energy” Installations (West Point: 825 homes, Fort Detrick: 353 homes)
Fort Bliss NGBS Emerald Community

- 84% Net Zero
- 250 New Multi-family Development
- Largest Emerald Certified Community
- 3% Construction Cost Premium
- 13.6 MW Community Solar
Why NGBS?

- Reduced Operating Expenses
- Utilities = Major Expense for Housing Portfolio
- Every Dollar Saved = Improved Amenities Quality of Life for Residents
Success: Reduced Operating Expenses

- 5,200+ kWh savings/year per home
- 1,300,000 kWh savings/year all homes
- $383/year per home*
- $95,000/year all homes*

*Based on 2012 electric rate of $0.073/kWh
Rooftop Solar Savings Model: Fort Bliss

• Provides 35% of Entire Community’s Electricity (~15,000 Residents)
• No Cost to BB Communities or Residents—SolarCity Owned & Managed
• Mitigates Commodity Rate Risk & Reduces CO2
Behavior, Big Data & Smart Meters
What’s Next? Nega-watts!

• Eliminate Upfront Cost – 3rd Party ESPC / PPA Type Model for Residential

• Guarantee No “Out of Pocket” for Owner or Residents
Better Buildings Challenge Results

- 8.8 million sqft
- 2% improvement in whole buildings registered in the Better Buildings Challenge

<table>
<thead>
<tr>
<th>Year</th>
<th>Properties with Whole Bldg. Data</th>
<th>Square Feet with Whole Bldg. Data</th>
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<tbody>
<tr>
<td>2014</td>
<td>39</td>
<td>8,697,504</td>
</tr>
<tr>
<td>2015</td>
<td>40</td>
<td>8,810,278</td>
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</table>
Better Buildings Opportunities

Benefits
• Best practice sharing with other multi-family partners
• Target driven program keeps asset management focused on reducing energy

Challenges
• Changing portfolio
• Lack of staffing for program oversight
• High growth
• Individual homes / units not comparable to commercial building data or report formats
• Large size of program (55K homes)
Join Us!

We want to work with YOU to ---

• Commit to significant energy reduction
• Pave the way with innovative ideas
• Share successful energy solutions
• Be recognized and earn media attention
• Invest in continual improvement

We are excited to tell your story, share your successes and profile your leadership!
Many ways to stay informed!

Follow us on social media!
- Twitter: @BetterBldgsDOE
- LinkedIn
- YouTube

Sign up for newsletters!
- **Beat Blog** (weekly posts)
  - Interviews/Q+As, follow-up pieces from partner events and press releases; solution deeper dive
- **Bulletin**
  - Monthly digest of new solutions, partners, news, events

Get Involved

- Monthly call to action email listing events, webinars, ways to participate with Better Buildings
- **Top-10 Solutions**
- Monthly top ten viewed solutions
  - Participate in monthly webinar series

Check out the **newsroom** for press on events highlighting partner accomplishments
THANK YOU!

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