

Commercial Buildings Integration

Amy Jiron, Acting Program Manager

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U.S. Commercial Property



6 million buildings

103 billion square feet

20 percent
of energy used

Commercial Property Context



6 million buildings

103 billion square feet

20 percent of energy used

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- Commercial stock: many market sectors, system types and ownership scenarios.
 - Approximately 50% of today's commercial building stock was built before 1980.
 - Approximately **80% of commercial stock** by floor area is privately owned
 - Approximately **50 billion SF** is leased to tenants (investor-owned);
 - Leased spaces represent **about 50% of all commercial energy use**

Building Technology Considerations

The New York Times

Blackstone's Deal With G.E. Highlights Its Real Estate Holdings

By LONDON THOMAS Jr. APRIL 12, 2015



... Blackstone may have started out doing mergers and acquisitions in the 1980s ... but these days the really big money is being made in real estate.

... Of the \$272 billion that Blackstone now oversees, \$81 billion is related to real estate, followed by private equity, high-yielding debt and hedge funds. Over the last two years, 50 percent of the firm's \$7.8 billion in core profits have come from what it has made from buying properties, sprucing them up and reselling them ...

CBI Strategies

Cultivate Market Leadership

...to understand technical and structural barriers and identify R&D requirements based on existing operational conditions.

Validate to Understand Performance

...cost and inform R&D based on study in dynamic, real world environments.

Innovate to Optimize

...through original research and development that uncovers holistic, cost-effective approaches to whole building efficiency.

Cultivate Market Leadership

The Better Buildings Challenge

- 300+ Partners
- \$2.5 billion in savings
- 4.4 billion square feet
- SOLUTIONS! 2,000+

The Better Buildings Alliance

- 200+ Partners
- 11 billion square feet of real estate (13% of all commercial buildings)
- 7 active Tech Teams

The Better Buildings Accelerators

- 200+ partnering organizations
- 9 active Accelerators helping breakdown barriers, create tools and resources for other businesses to use



Cultivate Market Leadership

Campaigns = industry partnerships, technical support, and national recognition for work with **solutions that can save Quads**. We collect cost and performance data across thousands of buildings committed to energy efficiency.



- 114,000 packaged heating/cooling units (RTUs)
- 1.6 million LED troffer lighting systems
- 1.7 million LED parking lights
- 330 million sq. ft. of ongoing energy analytics
- Green Lease portfolios representing 1.3 billion sq. ft.



\$160 million/yr and 1.4 million kWh/yr saved so far

Validate to Understand Performance

Ideation, Experiment,
Proof of Concept

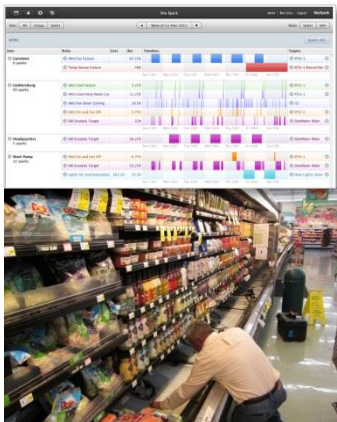
Testing, Scalability &
Application, Integration

Commercialization



3rd party, objective evaluation under dynamic conditions, using real data, and accounting for human interactions.

- Answer critical R&D questions (feedback loop)
- installation, commissioning, operation/user and maintenance requirements
- interactions with other systems, tools and equipment.
- collect, store and share building performance data (utilities, scientists, manufacturers, architects/engineers).

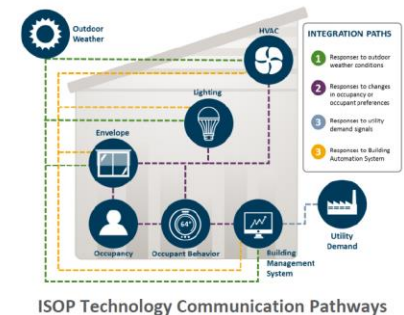
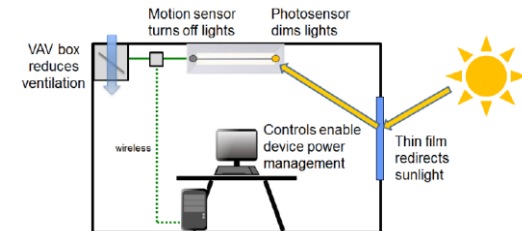


Innovate with Systems Approaches

...the systems yielded *additional* savings of 51-77%

Comparison of component- vs. systems-based savings for three integrated systems.

Option	Lighting EUI (kWh/sf/yr)	Lighting Savings relative to Baseline	Lighting Savings relative to Component-based Retrofit
Baseline (Fluorescent, scheduled control)	3.68	—	—
Component-based Retrofit (simple LED)	1.36	63%	—
Automated Shading and Daylighting	0.64	83%	53%
Workstation-Specific and Daylighting	0.31	92%	77%
Task / Ambient and Occupancy	0.67	82%	51%



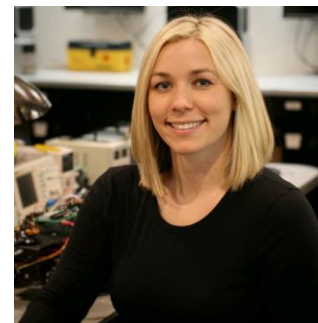
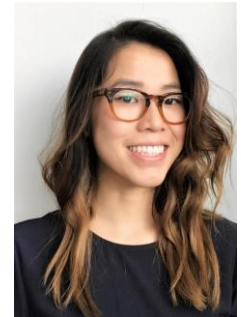
SOURCE: Lawrence Berkeley National Laboratory, *Energy Savings of Systems-Based Building Retrofits: A Study of Three Integrated Systems*. (DRAFT) Cindy Regnier, Paul Mathew, Alastair Robinson, Peter Schwartz, Jordan Shackelford, Travis Walter.

Innovate with Systems Approaches

Global ZE building market is
estimated to grow to
\$1.4 trillion by 2035

Source: Navigant Research. *Net Zero Energy Buildings*. (2016)

Commercial Buildings – This is us!



CBI Tracks

Tracks	Rooms, Days and Times
Energy Performance and Tools	Harrison and Wilson Mon: 1:30 - 5:30
Field Validation and Data Frameworks	Madison Weds: 9:00 - 12:30
Technology Systems and Packages	Commonwealth Thurs: 9:00 - 2:30

Mr. Gregg Fischer, PE– Director, Energy Systems @ Tishman Speyer



- 55,000,000 square feet class A commercial property
- Leadership with Innovation:
 - Building Automation
 - IoT
 - fuel cells, battery, TES and DR
 - Tenant Billing
- Rockefeller Center HQ (New York),

Program Manager (Acting), Commercial Buildings Integration
DOE Building Technologies Office
Amy.Jiron@ee.doe.gov

Thank you!