

Existing Building Series: Green Building Retrofits

July 12, 2023 | Session Overview

Panel

Laurie Kerr, FAIA, LEED AP, Principal Climate Advisor, USGBC & President, LK Policy Lab Kimberly Pexton, Head of Sustainability, JBG SMITH

Moderator

Roark Redwood, Senior Vice President, Technical and Government Solutions, National Institute of Building Sciences

Green Building Retrofit Overview

The National Institute for Building Sciences hosted an Existing Buildings 2023: Green Building Retrofits webinar on July 12, 2023, with experts discussing current methods of measuring energy consumption for the purposes of decreasing the carbon footprint of residential and corporate buildings.

In the last five years, building owners have been actively using green building retrofits as the key to attract more tenants, for competitive positioning in the marketplace, and easier and cost-effective operations and maintenance, as well as to reduce energy bills and consumption and carbon benchmarking.

According to The Rockefeller Foundation, upgrading and replacing energy-consuming equipment in buildings offers an important capital investment opportunity, with the potential for significant economic, climate, and employment impacts. In the United States alone, more than \$279 billion could be invested across the residential, commercial, and institutional market segments.

This investment could yield more than \$1 trillion in energy savings over 10 years. There are many factors that are part of green retrofitting, from real-time visibility of energy consumption to optimizing operations and maintenance. The webinar took a deep dive into these factors.

Past Vs. Present

Energy (then) $\rightarrow \rightarrow \rightarrow$ Carbon (now) Modest reductions (then) $\rightarrow \rightarrow \rightarrow$ Deep reductions (now) Near term (then) $\rightarrow \rightarrow \rightarrow$ Long term (now) Payback (then) $\rightarrow \rightarrow \rightarrow$ Net present value vs. do-nothing (now)

Past Methods of Measuring Energy

In the past 20 years, energy metrics were measured

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differently than they are now. For example:

- Energy cost: Energy cost budget method
- Energy use per square foot: energy use intensity (EUI)
- Energy Star portfolio management score: comparative efficiency

The most widely used tool for measurement in the past was an energy audit. Audit measures included:

- List energy reduction measures equipment upgrades
- Analyze cost and savings
- Determing the payback period: the number of years of savings to equal the capital expense

The typical payback periods of the past for commercial owners was generally a two- or three-to five-year payback period. For institutional and governmental owners, the period was greater – five to 20 years.

Retrofit Measures of the Past:

Two to five year paybacks included:

- Improved operations/retro-comissioning
- LED lighting with sensors and controls
- More efficient HVAC equipment
- Seal air leaks
- Low flow faucets and fixtures

Five to 20-year paybacks included:

- Better windows
- Roof insulation
- Major equipment upgrades
- Solar

That was then, this is now.

Over 85% of power plants in 2022 were renewable. We now have efficient electrical heating equipment, such as heat pumps and induction stoves for cooking.

The urgency and tools almost simultaneously have arrived. Several cities, including Boston, NYC, and Washington, DC, all have passed ordinances requiring that buildings reduce their energy consumption or meet certain carbon caps. Portfolios are committing to lower or no carbon targets over 15 to 20-year periods, and ESG reporting is now asking for portfolios and businesses to do that.

But the big goal is reducing the contribution to climate change. It's the inverse of before; climate on top, reducing energy is the bottom concern; the values are inverted.

The Metrics of Today

- Carbon Scope 1, Scope 2, and Scope 3
- Science-based targets
- Grid harmonization; peak energy more than annual energy

Scope 1: What is burning on site – reducing the onsite emissions

Scope 2: Electrical use from the grid-reducing as grid gets greener

Scope 3: Carbon emissions related to all the building materials used in a retrofit

Laurie Kerr, FAIA, LEED AP, Principal Climate Advisor, USGBC, and President, LK Policy Lab, said, "All energy is not equal. Peak energy, the energy that is going to produce the greatest demand on the grid becomes the most important thing."

An example is when a state like Texas experiences a huge heat wave, and everyone has their air conditioners on at the same time. We must make sure buildings have better insulation and aren't drawing a great deal of energy from the grid.

Peak energy is a primary concern now, and decarbonation plans are the primary method of measurement, not just audits.

What Today's Decarbonation Plans Include:

Strategic decarbonization plans have several purposes which include:

- Deep carbon reductions
- Long term capital plans through 2050
- Net present value compared to BAU rather than paycheck



Decarbonization measures are different than what we were doing in the past. It's not all about light bulbs anymore.

What Decarbonization Measures Include:

- Stop burning fossil fuel
- Peak load reduction
- Clean power
- Energy efficiency measures
- Refrigerants with low global warming potential

Energy Insights From JBG SMITH

According to Kimberly Pexton of JBG SMITH, potential ECM's represent a \$750,000 investment in the asset with a projected annual cost savings of \$146,000 – a 19% yield on cost, reducing the building EUI from 56 to 37.

Additionally:

- Long-term capital planning includes upgrades of key building equipment to more efficient systems. These systems include automation systems, HVAC equipment and replacement, and HVAC system retrofits.
- Efficiency capital projects include LED lighting retrofits, lighting controls, and low-flow water fixtures.
- Monitoring and tracking help to measure the impact of efficiency investment and to better plan for future improvements such as:
 - Real-time energy data and analysis platforms
 - Metering of subsystems prior to replacement

Site reference:

JBG SMITH: www.jbgsmith.com/about/sustainability

What's Next in The Existing Buildings 2023 Series

Join NIBS on October 24, 2023, for a webinar on Retrofitting for Resilience. As climate and hazard risks intensify, resilient buildings need to become the status quo. Resilient retrofits also open the door to indigenous populations, people of color, and low-income communities achieving social equity, as they are typically the communities most exposed to hazards. Learn more about the series.