SmartMarket Report

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Business Case for Energy Efficient

Building Retrofit and Renovation

Funding provided by U.S. Department of Energy through the Pacific Northwest National Laboratory

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Design and Construction Intelligence

SmartMarket Report

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Business Case for Energy Efficient Building Retrofit and Renovation SmartMarket Report

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McGraw-Hill CONSTRUCTION

About McGraw-Hill Construction

McGraw-Hill Construction (MHC), part of The McGraw-Hill Companies, connects people, projects and products across the design and construction industry, serving owners, architects, engineers, general contractors, subcontractors, building product manufacturers, suppliers, dealers, distributors, and adjacent markets.

A reliable and trusted source for more than a century, MHC has remained North America's leading provider of construction project and product information, plans and specifications, industry news, market research, and industry trends and forecasts. In recent years, MHC has emerged as an industry leader in the critical areas of sustainability and interoperability as well.

In print, online, and through events, MHC offers a variety of tools, applications, and resources that embed in the workflow of our customers, providing them with the information and intelligence they need to be more productive, successful, and competitive.

Backed by the power of Dodge, Sweets, *Architectural Record*, *Engineering News-Record (ENR)*, *GreenSource* and *SNAP*, McGraw-Hill Construction serves more than one million customers within global construction community. To learn more, visit us at www.construction.com.

Introduction

The opportunity for improving energy performance in the United States has never been greater. The Better Buildings Initiative proposed by the Obama administration is the latest national effort drawing attention to our building energy consumption and ways we can help reduce it—and win at the same time.

The economic downturn shifted the attention of firms and public owners with large building portfolios toward their existing buildings. With government and utility incentives, the time was ripe for focusing on retrofit and renovation investments that could save energy and money.

However, despite the fact that retrofit activity remained active during the down economy, only a tiny portion of the U.S. building stock has been affected. The opportunity has never been greater. We merely need to help create and seize those opportunities.

In order to do so, it is important to understand what drives American companies and building owners to adopt efficiency improvements and sustainability policies.

Understanding those drivers is the first step. Then, it is about making the business case to those different influence agents.

We were excited that the U.S. Department of Energy's Building Technology Program and the Pacific Northwest National Laboratory supported this effort because the results show that energy efficiency is occurring and will continue to occur. The levels of that activity depend on our ability to convey the full breadth of benefits that come from sustainable investments, of which energy efficiency is just the tip of the iceberg.

The research in this report provides new insights that build on previous research by McGraw-Hill Construction and others on how to create high-performing buildings. Some critical results include:

- **The commitment of corporate America to sustainability continues to grow, despite the adverse economy: 42% of the firms surveyed view sustainability as a business opportunity or as transformational, up from 37% just a little over a year ago.**
- **92% of companies report being influenced by operational savings in their decision to pursue energy efficiency projects, but market differentiation (73%) and employee satisfaction and productivity (71%) are also important.**
- **Renewable energy is seen as a potential business opportunity for some firms.**

It is obvious that the business case matters to firms, and energy efficiency and utility savings are the foundation of that case, but firms today expect more. Tenants are using their influence in a high-vacancy commercial office building market to demand green features (see page 65), and firms want market differentiation and competitive advantage.

Whether you are a manufacturer trying to get your energy-efficient products installed, a builder or engineer experienced in adding value to projects through better building practices, or policy makers wanting to lower the environmental impacts of our buildings, understanding how to make the right business case to the right person is critical.

We hope the data and market insights in this report help you make that case and seize those opportunities.

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Photograph by Robert Flynn c/o DOE/NREL (left) Photograph by Kathreen Fontecha/California Lighting Technology Center UC Davis (right)

From left: Durant Middle School, NC; Induction Lighting at UC Davis Parking Structure

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Making the Business Case

Importance of the Built Environment

The building sector is the single largest user of energy and emitter of greenhouse gasses in the U.S. Today's buildings consume 40% of U.S. energy, release 30% of U.S. greenhouse gas emissions and 38% of carbon dioxide emissions, and use nearly 13% of all potable water in the U.S.[1] Given that the U.S. is currently the largest global user of energy, it becomes even more important for the design and construction industry to take a leadership role in making buildings more efficient in their use of energy and water.

At first glance, designing new buildings and updating existing ones to achieve greater energy efficiency seems to be a straightforward and logical first step towards energy independence in the U.S. To the casual observer, the business case for greater energy efficiency in buildings is obvious. Using existing off-the-shelf technologies can yield impressive energy use reductions.

However, when examined more closely with the ultimate goal to achieve net zero energy for all buildings through the combined strategies of efficiency and renewable energy, the massive scale of investment required to upgrade the existing building stock is daunting. In addition, each industry sector has its own challenges, making it necessary to tailor the business case to each sector.

Building Sectors

This study examines the challenges and opportunities presented by four industry sectors in particular: office, retail, healthcare and education. One critical obstacle faced by the office and retail sectors, where buildings are typically leased to tenants, is that the savings generated by building operations often do not directly benefit the owner enough to make it easy to justify an investment. Additionally, tenants are far more conscious of the bottom line rent figures than of incremental operational cost savings.

The office sector faces an additional challenge because office buildings as assets see frequent turnover in ownership as well as tenants, causing the payback period for significant efficiency investments to be longer than the ownership period. Thus, an investment that seems sound on the surface does not make a compelling business argument for the level of widespread investment necessary to achieve a serious reduction in energy use in the building sector.

The healthcare and education sectors face an entirely different set of issues. Their owners are often nonprofits, government or for-profit businesses with narrow profit margins where the battle for investment dollars is challenging. However, there are unique opportunities in these sectors. Education buildings are expected to offer cutting-edge facilities. Hospitals, and some university buildings, are also particularly intensive users of energy, so decisions that can help them reduce this use can be encouraged with compelling intelligence.

Finding Opportunity Through Energy Efficiency and Sustainability and Overcoming Challenges

The fundamentally compelling business case for efficiency provides far more opportunities than challenges. The ambitious goal of improving efficiency across the entire built environment is achievable, but only through a serious recognition and response to the obstacles faced in these major industry sectors.

This report, through in-depth market research and case studies, demonstrates that industry-wide adoption of efficiency investments in each of these sectors is ultimately profitable and makes good business sense.

1 U.S. Energy Information Administration, U.S. Department of Energy, 2007

This report was sponsored under contract by the Building Technology Program within the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy and managed by the Pacific Northwest National Laboratory. The data and narrative in this report do not reflect the opinion of the U.S. Department of Energy or the Pacific Northwest National Laboratory.

Executive Summary

Retrofit and Renovation: Ripe for Opportunity in Energy Efficiency

Overall, the existing building market is an important untapped area for upgrades and activity. The U.S. built environment comprises more than 77.9 billion square feet of commercial building space,and only a small percentage of that is new construction each year.[2] In 2008, new commercial construction only accounted for 1.8% of total building floor area.[3]

However, the amount of renovation and retrofit activity remains relatively low. There are many reasons for this, including access to funding, insufficient incentives and lack of interest in upgrading those buildings.

McGraw-Hill Construction expects continued growth in major commercial renovation activity over the next five years, with $53 billion anticipated by 2014 for major projects, a large portion of which includes energy efficiency investments and activities.

Energy-Efficient Retrofit and Renovation Projects Are Occurring— and Planned for the Future

78% of respondents plan to do energy efficiency upgrade projects in the next two years. This is a high commitment to investment, but it is also a slight decline from the level of activity over the last two years.

Business Benefits Are Expected and Can Be Used to Make the Business Case

Firms have high expectations about the benefits coming from sustainability initiatives, including investments in energy efficiency and other green building efforts.

In fact, these expectations are increasing over time, only placing more burden on internal staff at these organizations who are responsible for making the business case.

It is incumbent upon the industry to recognize these needs when trying to influence these levels of investment.

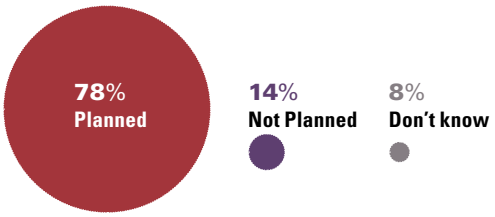
FINANCING: Current Energy-Efficient Retrofit and Renovation Projects Use Internal Resources, Not Outside Funds

85% of the energy efficiency projects were funded through capital budgets and company profits. Only 16% were financed from performance contracting and 6% from bank loans.

Relying on capital budgets and company profits is ultimately a limiting factor for the efficiency market, and **financing needs to be made more available and more attractive to help the market grow.**

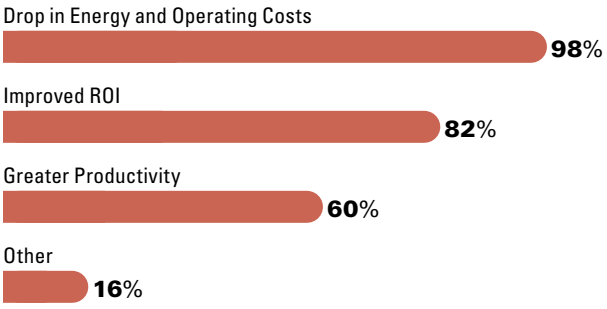
Percentage of Firms Planning Energy Efficiency Upgrades in the Next Two Years

Source: McGraw-Hill Construction, 2011



Expected Business Benefits from Sustainability Adoption

Source: McGraw-Hill Construction, 2011



2 Annual Energy Outlook 2010, U. S. Department of Energy, Energy Information Administration http://www.eia.doe.gov/oiaf/aeo/excel/aeotab_5.xls; 3 McGraw-Hill Construction, Building Stock Database.

INFLUENCING ENERGY EFFICIENCY RETROFITS:

Utility Savings Lead, But Other Factors Also Significant

Businesses recognize a broad range of incentives for investing in efficiency.

- **Utility cost savings is by far the most important factor; it is selected as a major influence by 43% of respondents, compared to 17% or less for all other factors.**
- **Other factors with larger profit margins, including employee/occupant satisfaction and productivity and improved asset value, can drive the market, but better benchmarks and data are required to make these elements stronger aspects of the business case.**

CREATING BUSINESS VALUE:

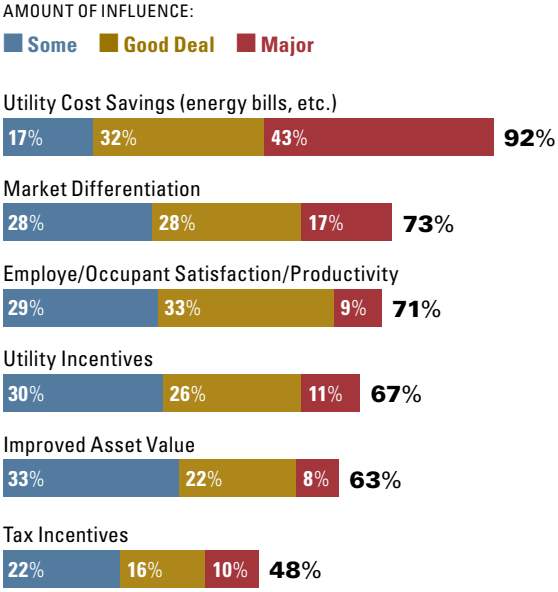
Renewables and Net-Zero Energy Buildings Offer Opportunity for Product and Service Companies

The industry sees strong opportunities in investing in renewables and net zero to help grow their businesses. Almost half (42%) of the businesses see an opportunity in buildings achieving net zero and two thirds (66%) regard increasing the percentage of their energy from renewable sources as important for their companies.

Corporate America regards investment in these resources as important for their bottom line, and they express interest in public investment to develop new technologies.

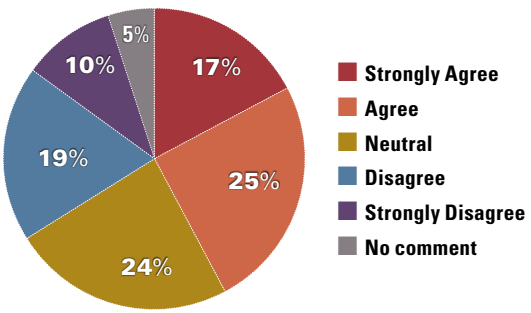
Influence Factors Behind the Business Case for PAST Energy Efficiency Retrofit Activities

Source: McGraw-Hill Construction, 2011



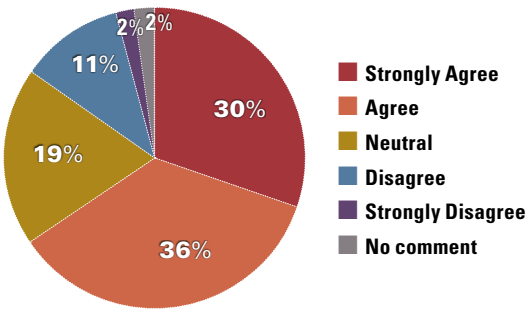
The Shift to Net Zero Provides Opportunity for Our Company in the Market

Source: McGraw-Hill Construction, 2011



Increasing the Percentage of Our Energy from Renewable Sources Is Important for Our Company

Source: McGraw-Hill Construction, 2011



Key Findings and Recommendations

by Sector and Firm Size

The key drivers influencing decision makers to invest in energy efficiency retrofits and renovations sometimes vary by firm size and by industry sector. As a result, some strategies may be more effective when trying to influence the activity levels of these specific players.

Larger Firms (Annual Revenues of over $500M)

These firms include some of the largest corporations in the U.S. Due to the breadth of their building portfolios, they offer a strong potential market for significant efficiency adoption.

- **Overall, larger firms are bigger adopters of sustainability efforts.**

  Implication:
  They are currently the strongest market for energy efficiency and also relatively well-informed about a broad range of sustainability measures.

- **Decision-making authority tends to be higher up in the organization for larger firms than for smaller firms.**

  Recommendation:
  Efforts that target the C-suite employees (CEOs, CFOs, etc.) may succeed particularly well in this segment to encourage broader adoption.

- **Larger firms have greater expectations for high returns on their efficiency investments in multiple measures beyond just cost savings.**

  Implication and Recommendation:
  Being able to demonstrate strong results for efficiency gains is particularly important when marketing to this group. This is particularly true with productivity gains. Therefore, emphasizing those gains to this audience may reinforce the business case beyond utility cost savings.

- **Competitive advantage, customer need and staff retention/talent acquisition are all drivers that resonate with this segment more than they do with smaller firms.**

  Recommendation:
  Emphasizing the impact of efficiency on the benefits they can offer to customers and to their employees should be an effective strategy when dealing with larger firms.

- **A greater percentage of larger firms report seeing ROI gains from sustainability efforts than smaller firms. One possible reason is their ability to take advantage of economies of scale.**

  Recommendation:
  Emphasizing this strategy can not only increase interest in efficiency improvements but may increase the scope at which the larger companies are willing to undertake them.

Smaller Firms (Annual Revenues from $250M to $500M)

The smallest firms included in this study still qualify as large businesses when compared to the Small Business Administration's definition of a small business. However, there is a marked difference in how companies with revenues of $500M or less make decisions about their investments in efficiency versus even larger firms.

- **Smaller firms have a greater expectation around cost savings than larger firms.**

  Implication:
  This fact suggests that marketing with an emphasis on cost savings could be quite effective.

- **Chief Sustainability Officers (CSOs) in smaller firms have more influence on financial decisions than those in larger firms.**

  Recommendation:
  Marketing to CSOs is more likely to be effective in this sector than with larger firms. Previous studies by MHC have suggested that CSOs are more conscious of the need to make a clear, straightforward business case around green than other corporate officers. Materials that aid them in their ability to do so, combined with an emphasis on the aspirational goals around sustainability and green that typically drive these professionals, would be most likely to appeal to this group.

- **Concern over government regulations is the only driver selected by a higher percentage of smaller companies than larger ones. This may be due in part to fewer internal resources that can interpret existing regulations and track trends for upcoming ones to ensure the company is positioned correctly.**

Recommendation:
This sector offers opportunity for firms that provide services to reduce corporate exposure to environmental risk. Additionally, this may be an audience heavily influenced by government policy and receptive to activities that align with these policies. This audience would likely be receptive to advice on how to help navigate policy shifts.

Building Sector: Education

The education sector includes both K–12 schools and higher education as well as both public and private schools.

- **A smaller percentage expect to see improved ROI compared to other sectors, despite the fact that all of the respondents from the education sector expect to see energy and operating costs drop due to efficiency improvements.**

Implication:
These results suggest that operating cost savings alone may not be as compelling an argument for increasing efficiency investment in this sector as emphasis on other factors.

- **One strong factor to emphasize with the education sector is market differentiation. Over two thirds of the respondents in this sector regarded this factor as influential, compared to an average of just under half for all other sectors.**

Recommendation:
Positioning increased efficiency investment as a way to distinguish themselves from other schools is likely to be an effective argument in this sector. Differentiation will also be important in attracting students given their increased interest in university sustainability commitments when selecting schools.

- **A higher percentage of respondents in the education sector express concern over the challenge budget limitations present in investing in improved efficiency, and performance contracts are also more widely adopted in this sector than in any other.**

Recommendation:
Providing alternative methods of financing improvements that education firms do not need to include as a line item in a budget may help increase investment in efficiency.

- **The education sector is one of the most experienced with sustainability and green measures, and that commitment appears to be growing. The majority of education respondents (80%) rank their institutions at the two highest levels of sustainability adoption, and that has grown by 9% over the last 18 months. In addition, they are also the highest adopters of renewable energy of any sector.**

Implication:
Expect this to be a particularly sophisticated and savvy market when it comes to efficiency measures, and one open to more cutting-edge technologies.

- **Educational institutions have doubled their activity around measuring emission reductions and tracking LEED certified building activity in the 18 months since MHC's previous investigation. This result demonstrates that these institutions could be an important resource in helping to establish performance benchmarks—a critical factor behind an increase in overall adoption of efficiency.**

Building Sector: Healthcare

- **Hospitals are the second most energy-intensive building sector in the U.S. As a result, operating cost savings alone can have a notable impact on their bottom line, which is why energy savings is cited by many respondents from this sector as very important.**

Recommendation:
It will be important to always remember this group is responsive to these utility savings.

- **A higher percentage of healthcare respondents consider productivity improvements and asset value to have a major influence on their efficiency investments compared to other sectors, which demonstrates that energy consumption is not the only important driver for healthcare respondents. Key drivers for a higher percentage of healthcare respondents than for other sectors include customer need and staff retention/talent acquisition.**

Recommendation:
Hospitals need to be approached with benefits that highlight multiple factors, including but not restricted to energy consumption.

- **25% of healthcare respondents report not knowing how to measure ROI for sustainability efforts, despite the fact that 100% expect improved ROI as a key benefit. In addition, 14% more healthcare respondents state that they are challenged by a lack of understanding of the financial benefits of green than the average across all sectors. These institutions would clearly benefit from greater education and more benchmarks focused on their industry.**

- **Healthcare institutions are coming to sustainability much later than other sectors like education or office. In the sustainability scale, 50% rate themselves as level 3, suggesting that they are still looking at how to best implement sustainability and do not yet define themselves as sustainable organizations.**

Implication:
There is a potential market for consultative services in this sector. Those seeking to increase sustainability and efficiency in healthcare need to consider education as part of their approach.

Data: Retrofit and Renovation

Market Activity and Sizing

Construction Activity at Large:

Renovations versus New Construction

Construction is a critical part of the U.S. economy. At 6.5% of GDP, it is the second largest contributor to U.S. GDP behind healthcare. However, the composition of that activity has changed since the recession—with more emphasis on existing buildings versus new construction.

Construction Activity to Date

In 2010, the value of new U.S. construction starts totaled $431.6 billion, down from $670 billion in 2005.

New commercial construction activity ended 2010 at $147 billion, while the value of major commercial retrofit and renovation projects grew from $31.4 billion to $41 billion over the same period.[4]

In 2010, major retrofit and renovation comprised 64% of all construction projects, up from 60% in 2009, with a steady increase since 2006. A primary reason for this shift may be credit availability during the economic downturn, with less capital available for new construction projects. The result has been an increased emphasis on retrofit and renovation projects.

Commercial Renovation Activity Going Forward

McGraw-Hill Construction expects continued growth in major commercial renovation activity over the next five years, with $53 billion anticipated by 2014 for major projects.

Overall, the existing building market is an important untapped area for upgrades and activity. The U.S. built environment covers more than 77.9 billion square feet of commercial building space, and only a small percentage of that is new construction each year.[5] In 2008, new commercial construction only accounted for 1.8% of total building floor area.[6]

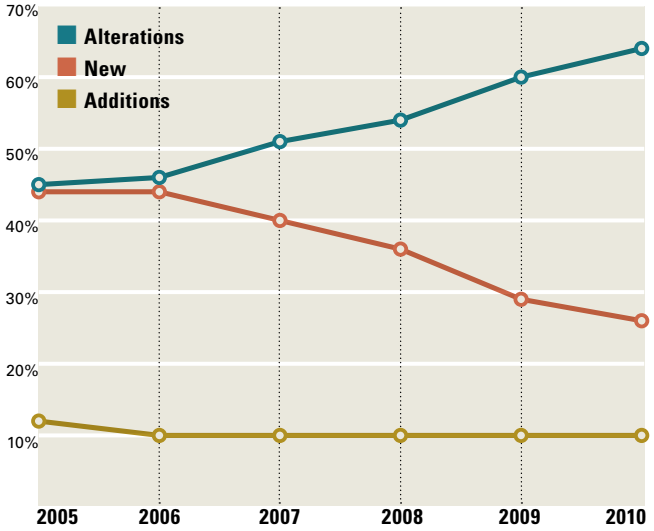
However, the amount of renovation and retrofit activity remains relatively low. There are many reasons for this, including access to funding, insufficient incentives and lack of interest in upgrading those buildings.

There are shifts that may increase energy efficiency activity:

- **Concerns about energy consumption, costs and climate change continue to encourage support for increases in the energy efficiency of existing buildings.**
- **Energy efficiency is perceived as affordable and achievable with technologies currently available.**

Commercial Construction Based on Number of Projects Started (2005–2010)

Source: McGraw-Hill Construction, 2011



Energy-Efficient Building Share of Retrofit Market (In Billions of Dollars)

Source: McGraw-Hill Construction, 2011

- **Many incentives and programs now encourage retrofit and renovation activity with an energy efficiency component.**

As a result of the above factors, most retrofit and renovation activity that is occurring includes an energy efficiency element such as lighting or HVAC upgrades (see page 18). Rebates for efficient lighting and mechanical products have encouraged these investments.

In 2010, energy-efficient building retrofits comprised 66%–75% of $41 billion of total major retrofit and renovation spending. By 2014 that share is expected to rise to 85%–95% of $53 billion of total major retrofit and renovation spending.[7]

4 McGraw-Hill Construction, Construction Market Forecasting Service, as of December, 2010. 5 Annual Energy Outlook 2010, U.S. Department of Energy, Energy Information Administration http://www.eia.doe.gov/oiaf/aeo/excel/aeotab_5.xls. 6 McGraw-Hill Construction, Building Stock Database. 7 McGraw-Hill Construction, 2011 Green Outlook, 2010.

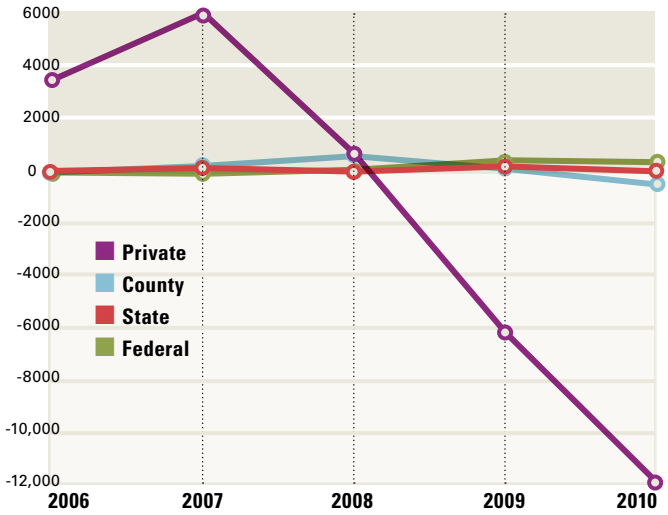
Private versus Public Renovation Projects

Many privately funded retrofit and renovation projects were strongly impacted by the recent economic downturn. In contrast, retrofits and renovations in the public sector increased from 2008 to 2009, and federal projects continued to increase through 2010, as can be seen from the figures below.

The stability and growth in public sector retrofit and renovations suggests a positive impact of government initiatives—particularly federal ones, such as the American Recovery and Reinvestment Act (ARRA) and other economic recovery efforts. ARRA included over $30 billion for provisions encouraging investment in energy efficiency improvements in buildings to a number of federal agencies including the U.S. General Services Administration, Department of Energy, Department of Defense, Department of Housing and Urban Development and Department of Veterans Affairs.

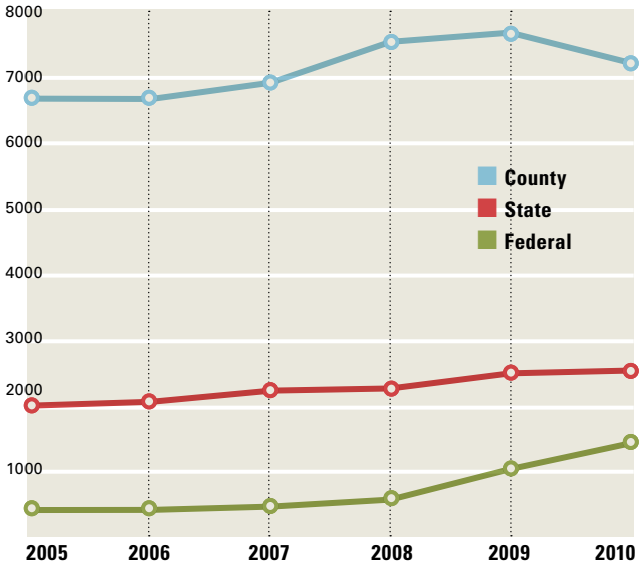
Growth in Number of Renovation Projects
(Year over Year)

Source: McGraw-Hill Construction, 2011



Public Renovation Projects (2005–2010)

Source: McGraw-Hill Construction, 2011



Green Building and Green Retrofit and Renovation Market Opportunity[8]

New Green Building Market Size

Green building has experienced dramatic growth while a severe economic downturn has resulted in sharp declines in overall construction activity. The U.S. market for new commercial green building increased from $3 billion in 2005, comprising 2% of the commercial building market, to $41–$51 billion in 2010, comprising 28%–35% of the market.

According to McGraw-Hill Construction's five-year construction market forecast, by 2015 the new commercial green building market is expected to reach $118–$141 billion and comprise 40%–48% of the market based on the current construction forecast for 2014.

Retrofit and Renovation Green Building Market Size

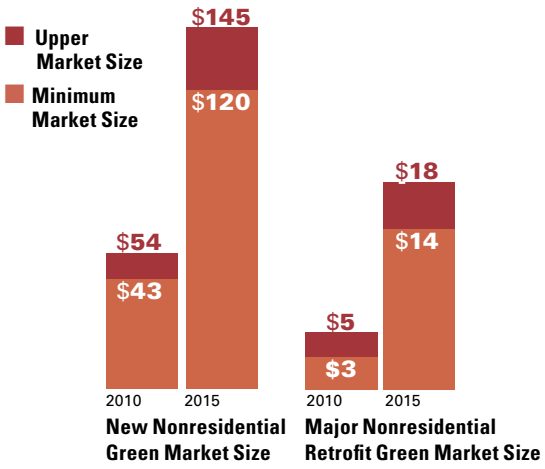
The green share of the retrofit and renovation market is also expected to grow. In 2010, the green share of the total commercial retrofit and renovation market was 7%–12%, equating to a $3–$5 billion market opportunity.[9]

In five years, McGraw-Hill Construction estimates that the green share of retrofit and renovation activity will reach 25%–33%, equating to a $13–$18 billion, based on the current forecast of 2014 activity.[10]

Green renovation projects tend to be larger (see page 13). As a result, the green share of renovation activity is less likely to be significantly influenced by smaller renovation and remodeling projects.

Projected Green Building Market Growth in Billions of Dollars (2010–2015)

Source: McGraw-Hill Construction, 2011



Green Building Definition

McGraw-Hill Construction uses the following definition of green building, which encompasses more than energy efficiency.

To be considered a green building, a project must be energy efficient and water efficient, have improved indoor air quality and include features that use renewable resources.

Therefore, a building that focuses solely on one aspect of environmental performance (e.g., energy) is not considered a green building, nor is a building that has only one or two products that lead to improved environmental performance.

Buildings certified under recognized green building rating systems are typically more narrowly defined given their specific requirements. These buildings are a subset within McGraw-Hill Construction's definition.

8 Note: The market size numbers provided by McGraw-Hill Construction are based on the overall project valuation. The way this money is allocated to different products, technologies, labor, etc. is included. 9 McGraw-Hill Construction, 2011 Green Outlook, 2010. 10 Ibid.

Retrofit and Renovation:

Project Size and Sector Activity

Project Size

McGraw-Hill Construction's research shows that the largest construction projects by value—both new construction and retrofit and renovation—are going green. This is true in almost every area of commercial construction whether it is large hospital projects or showcase office buildings.

This trend is critical because major projects create a market demand for green building products, technologies and experienced designers and contractors. These larger green projects will cause the market to respond to those needs and inevitably bring the costs down for incorporating green products and technologies.

As can be seen in the figure at right, large and therefore costlier projects are more likely to be green.

Sector Activity

- **OFFICE: Due to the economic downturn, new office construction decreased from 46% to 30% of nonresidential construction in 2010. The office retrofit and renovation market has suffered as well, resulting in a 23% decline in 2010. However, according to McGraw-Hill Construction's forecast, total retrofit and renovation projects in the office sector are expected to steadily increase over the next five years.**

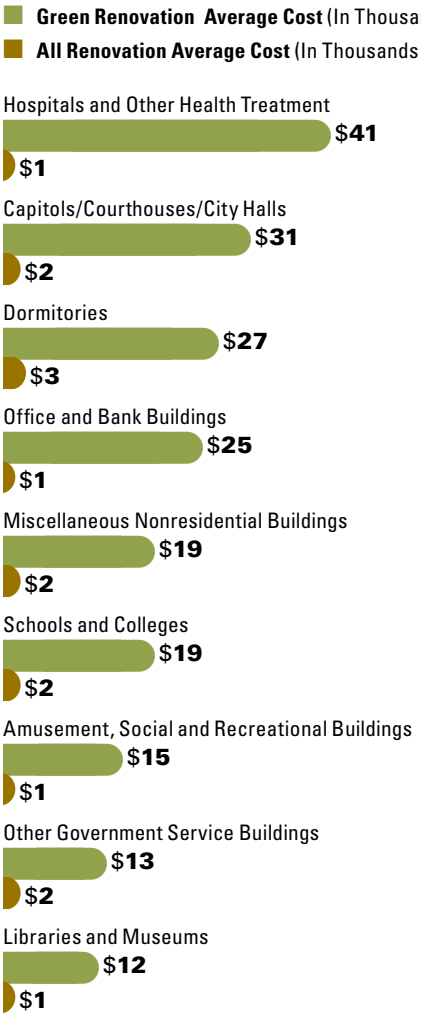
- **EDUCATION: The downturn affected new construction starts in the education sector over the past two years, with decreases of 17% in 2009 and 7% in 2010. However, aside from a small decrease in 2009, retrofit and renovation activity has seen consistent growth. Steady and substantial growth in retrofit activity is expected over the next five years, with 2014 levels nearly 40% higher than those in 2010.**

- **HEALTHCARE: The value of retrofit and renovation starts in the healthcare sector rose again in 2010 after a decline in 2009. McGraw-Hill forecasts steady growth of retrofit and renovation activity in this sector.**

- **RETAIL: Retail construction has especially suffered from the economic downturn, with large declines in new construction over the past three years. Retrofit and renovation projects in the retail sector have fared slightly better and stayed steady in 2010. McGraw-Hill Construction forecasts slow, gradual increases in retrofit and renovation activity going forward.**

Average Cost of Renovation Projects
(2009–2010)

Source: McGraw-Hill Construction, 2011.



Retrofit and Renovation Regional Activity:

Non-Green versus Green

McGraw-Hill Construction's regional data show a variation in the number and value of retrofit and renovation projects across the U.S.

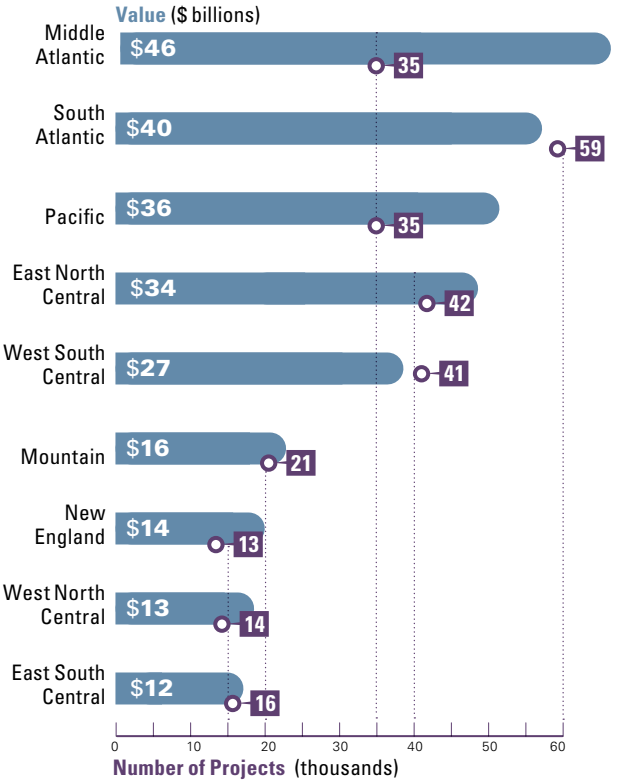
Non-Green (Including Projects That Are Only Energy Efficient)

- **VALUE OF PROJECTS: Retrofit and renovation projects in the Mid-Atlantic region are the highest in value, followed by the South Atlantic and Pacific regions. This difference may be attributed to the growth in public retrofit and renovation projects encouraged by the provisions of ARRA and other federal government policies. (See page 25 for more on government policies.)**

- **NUMBER OF PROJECTS: The South Atlantic region has the highest number of retrofit and renovation projects followed by the East North Central and West South Central regions.**

Total Value and Number of Renovation Projects by Region (2005–2010)

Source: McGraw-Hill Construction, 2011



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Retrofit & Renovation Market Activity and Sizing

Retrofit and Renovation Regional Activity: Non-Green versus Green CONTINUED

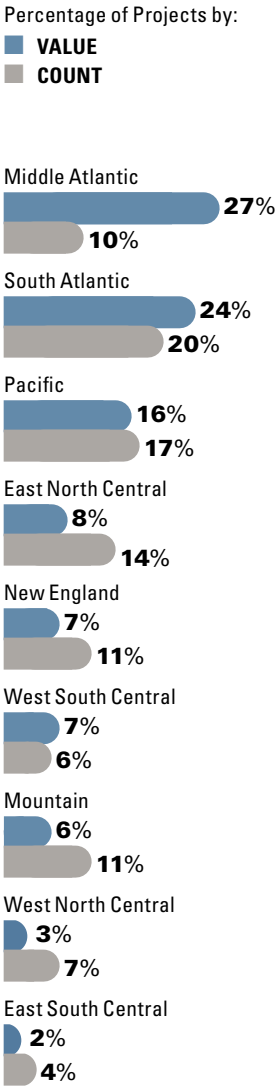
Green Projects

There are similar regional geographic distributions for green projects.

- **REGIONAL VALUE OF PROJECTS: The Mid-Atlantic region has the largest investment in green certified renovation projects, at 27%.**
- **REGIONAL NUMBER OF PROJECTS: The South Atlantic region has the largest number of green certified renovation projects, at 20%.**

Percentage of Total Green Renovation Projects By Region (2010)

Source: McGraw-Hill Construction, 2011



Data: Business Case for Green and Energy Efficiency Upgrades

Current and Future Levels of Energy Efficiency Activities

Percentage of Firms Who Have Engaged in Energy Efficiency Activities

The last two years have seen strong energy efficiency activity.

- **Nearly all (91%) of the firms surveyed have undertaken energy efficiency upgrades on buildings in their portfolio in the last two years.**
- **42% report that more than 30% of their building portfolio is green or high performing.**

These results demonstrate that nearly all of the firms surveyed are familiar with the benefits of energy efficiency. They also reinforce the impact of government incentives for energy efficiency, including rebates and tax credits, from the Energy Independence and Security Act and the American Recovery and Reinvestment Act.

VARIATION BY FIRM SIZE

Throughout the survey, larger firms demonstrate a larger investment in efficiency, including the number who have engaged in efficiency projects over the last few years.

- **Larger Firms (revenues of over $500 million):** 93% completed efficiency work.
- **Smaller Firms (revenues of $250 million to $500 million):** 84% completed efficiency work.

VARIATION BY SECTOR

Education: 95% of education institutions have improved the energy performance of buildings in their portfolio in the last two years. Factors influencing this large commitment include:

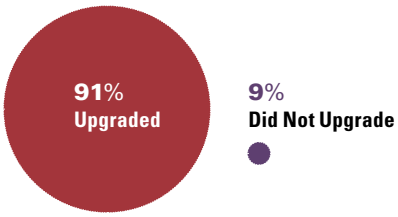
- Legislation driving schools and municipal buildings to greater efficiency (K–12 schools)
- Market differentiation (higher education)
- Cost savings due to budget restrictions (K–12 schools and higher education)

Percentage of Firms Planning Energy Efficiency Upgrades in the Next Two Years

78% of respondents plan to do energy efficiency upgrades on buildings in their portfolio in the next two years. While this indicates a relatively robust market, it also suggests a slight decline expected in overall energy efficiency projects compared to the past two years, when 91% reported doing efficiency projects.

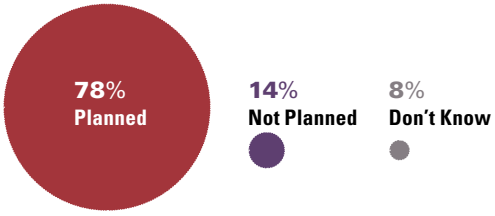
Percentage of Firms Who Conducted Energy Efficiency Upgrades in the Last Two Years

Source: McGraw-Hill Construction, 2011



Percentage of Firms Planning Energy Efficiency Upgrades in the Next Two Years

Source: McGraw-Hill Construction, 2011



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Current and Future Levels of Energy Efficiency and Green by Percentage of Total Buildings

CURRENT LEVELS OF ACTIVITY

As of late 2010, firms are seeing a relatively high level of energy efficiency and building investment.

- **Upgrading less than 30% of their buildings: 39% of respondents**
- **Upgrading 31%–60% of their buildings: 31% of respondents**

FUTURE LEVELS OF ACTIVITY

In addition to the reduction in the number of firms planning to conduct energy efficiency upgrades on their buildings, the respondents also expect a slight reduction in the number of buildings which they intend to upgrade.

- **More respondents expect to upgrade only 1%–15% of buildings—from 13% to 25%.**
- **Fewer expect to update 16%–60% of their buildings—from 70% to 53%.**

An exception to this trend is the number of firms with the most aggressive approach to efficiency, where the percentage of firms that report they will upgrade more than 60% of their buildings increased from 11% to 15%.

These slight declines may be the result of a number of different factors:

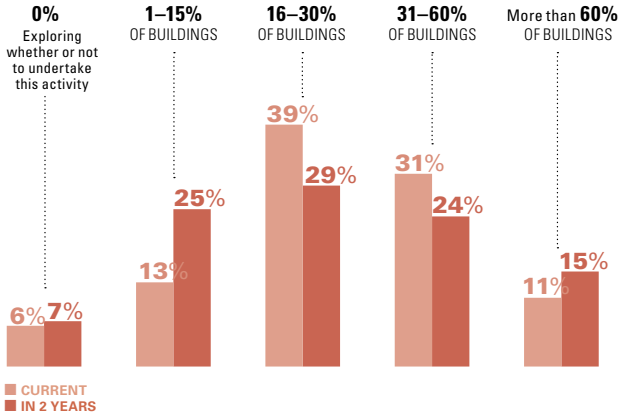
- Some incentives that have been in place over the last two years are scheduled to end within the next two-year window.
- Many simple upgrades with low investment and high returns may have been made on poorly performing buildings.

These results demonstrate the need for a strong business case for energy efficiency improvements to encourage a more robust efficiency market than is currently expected.

While upgrading existing buildings is still proposed by most of the industry, the slight decline in the level of work is noteworthy. In order to make a significant impact on U.S. energy use, an increase in efficiency upgrades is necessary across the entire building stock. A company—and society as a whole—will not receive the full benefits of upgrades unless there are larger levels of investment in these activities.

Current and Future Level of Energy Efficiency and Green Building Investment Activity

Source: McGraw-Hill Construction, 2011



Energy Efficiency Activities Undertaken

in the Last Two Years

Energy Efficiency Activities Undertaken in the Last Two Years

Over 70% of respondents installed four major efficiency features in their existing buildings, demonstrating that most efficiency retrofits cover a range of systems rather than focusing on one area.

- **LIGHTING: 94% of respondents performed lighting upgrades.** Lighting improvements are widely acknowledged to require minimal investment and produce measurable results.

- **HEATING AND COOLING: 85% also invested in efficient HVAC systems, and 74% incorporated zoned temperature controls.** More efficient HVAC systems typically require a larger up-front investment, but clearly they are also perceived to deliver strong returns. The investment in zoned temperature controls is also a reminder of the importance of emphasizing building operations as much as the equipment installed to improve energy performance. These controls are most effective when adjusted to the current use of a space.

- **BUILDING AUTOMATION CONTROLS: 72% included building automation controls in their existing buildings.** Building automation controls help contribute to more efficient building operations. Their heavy use demonstrates that good building operations are needed after upgrades in order for strong energy performance to be achieved.

- **EFFICIENCY VERSUS RENEWABLES:** Efficiency investments are more common than investments in renewables. Compared to previous surveys, the reported use of renewables is also slightly reduced—from 50% down to 40%.

VARIATION BY FIRM SIZE (BASED ON ANNUAL REVENUE)

For each of the activities listed, companies with an annual revenue above $500 million report more activity than smaller companies.

- **Larger Firms (revenues of over $500 million):**
  - Lighting Upgrades—95%
  - HVAC Upgrades—88%
  - Zoned Temperature Controls—78%
  - Building Automation Controls—76%
  - Renewables—42%

- **Smaller Firms (revenues of $250 million to $500 million):**
  - Lighting Upgrades—88%
  - HVAC Upgrades—77%
  - Zoned Temperature Controls—62%
  - Building Automation Controls—58%
  - Renewables—35%

The difference is not statistically significant, ranging from 7% to 18% more respondents by category, but the consistency of the increase across the categories suggests larger overall investments in efficiency by the largest companies.

VARIATION BY SECTOR

Education: 84% of the education sector reports installing renewables in the last two years. Renewable energy use is particularly popular in the education sector because visible solar panels and windmills are used as "teaching moments" to increase discussion about energy savings.

In fact, the U.S. Department of Energy's Wind for Schools program seeks to encourage installation of windmills, with a goal to "develop a knowledge base for wind energy in schools." As of January 28, 2011, 204 institutions, including K–12 and higher education, have participated in the program.[11]

11 U.S. Department of Energy. "Wind Powering America: Wind Energy for Schools." http://www.windpoweringamerica.gov/schools.asp.

Technology

Most practicable energy-efficiency upgrades fall within one of three categories: lighting systems, building envelope and mechanical systems. Current technologies in all three categories can provide significant efficiencies, but there are limits to what they can achieve alone.

Dimming the Lights

Building owners and managers first look to lighting technologies for improving building performance. In facilities that require few air changes, like offices and academic buildings, lighting can consume as much as 30% of total energy.

Daylighting control systems are the lowest-hanging fruit. After-market systems require the least capital cost. Motion and daylight sensors are affixed directly to lamps, and the electricity savings pays back in approximately two years. If the project includes installation of lamps that lower the power density, then there is the added benefit of lowering cooling load in climates where such reductions make sense. More expensive installations include perimeter light detection and computerized lamp controls, while an undertaking like installing light shelves will not pay itself back for more than a century.

The U.S. Green Building Council headquarters demonstrates the most reasonably priced strategies working in tandem. Washington, DC–based Envision fashioned the office from two floors of a 1970s mid-rise, with lighting consultant Clanton & Associates. The 75,000-square-foot interior was designed for a lighting load of .54 watts per square foot, but uses only .25 watts per square foot. It should be noted that good architectural and interior design plays a big role in this achievement. For example, to maximize daylight penetration, the project team configured desks to minimize glare. It also specified light-colored carpet to reflect daylight inward.

Envelope Improvements

In the appropriate climate, recladding a building can improve energy performance by as much as 70%—but payback is between 50 and 100 years. Even the simplest attempt to reduce thermal bridging in the building envelope, such as adding insulation or improving glazing, is expensive.

Mechanical Upgrades

Between 30% and 45% of a building's energy load can be devoted to heating and cooling. Mechanical upgrades can range from simple—in renovating the 1920s Joseph Vance Building in Portland, Oregon, Zimmer Gunsul Frasca Architects and engineer Arup retrofitted local thermostats to every steam radiator—to substantial, such as retrofitting under-floor ventilation.

Mixed-mode systems reflect this whole range. "The most inexpensive way to naturally ventilate buildings in swing seasons [relies] on occupants and facilities managers to handle it. The other route is a fully technical answer, which means that everything is wired and windows open and close at the command of a central computer," explains Buro Happold Consulting Engineers principal Lisa Matthiessen.

In this category, the most common practice is to retrofit variable frequency drives to fan motors, the payback of which is similar to simple daylight-control projects. Matthiessen says that chilled beams could become equally commonplace if these technologies' interactions with ventilation and humidity control were better understood. "Whereas variable frequency drives are a one-size-fits-all solution, most retrofits must be specific to the building," she says. Evaporative cooling systems are recommended for dry climates, whereas heat recovery ventilators, which mitigate the temperature of incoming ventilation, should be considered for colder locales.

An Integrated Aproach

Retrofitting existing building stock to rigorous net-zero standards "doesn't pass the giggle test—right now, that's a really high bar," says Chicago-based architect Douglas Farr, founder of the highly regarded sustainable planning and architecture firm Farr Associates. Farr says the lighting industry is most dynamic about launching new sustainability technologies, particularly new LEDs.

Yet reaching net-zero won't happen simply by piling on new technologies. The right strategies must be determined according to climate and program—recladding a building located in a Mediterranean climate doesn't promise much efficiency improvement. They must be designed as part of a system; for example, configuration of employee workspaces can have an impact on daylight control. And there must be buy-in from facilities managers. Matthiessen says, "Teams that are more experienced and integrated are starting to find ways to really bring down costs." ■

Current and Future Influence Factors on the Business Case for Energy Efficiency Upgrades

Influence Factors on Efficiency Projects in the Last Two Years

Utility cost savings are the strongest influence factor by far, with at least some influence on 92% of the respondents. Even more striking, though, is the fact that 43% select utility cost savings as a *major* influence—two to four times more than any other factor. Utility cost savings can be more easily measured and reported than ROI, and they are directly attributable to energy efficiency improvements.

Other Measures Selected by More Than 70% of Respondents:

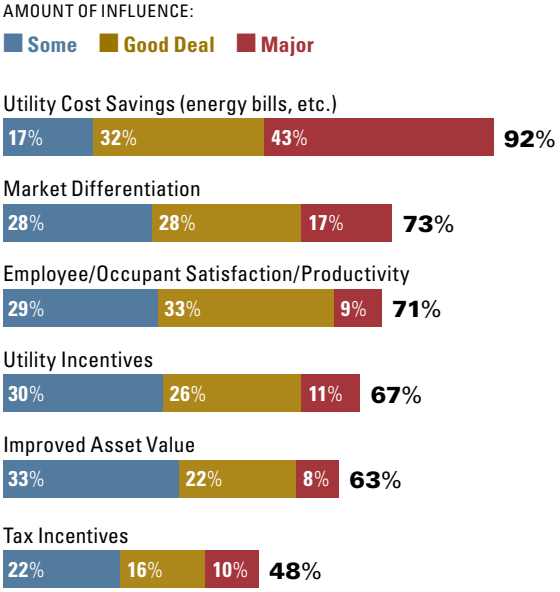
- **MARKET DIFFERENTIATION: This factor is perceived to be a major influence by 17% of the firms surveyed.** Efficiency is important to the market for multiple reasons—from good corporate citizenship to attractive leasing terms. An emerging legislative trend for commercial buildings to report their energy use could increase the influence of this factor by creating a stigma around buildings that are not high performing. If this occurs, the market could more easily track the value of energy efficiency and green efforts, and competition could lead to increased efficiency efforts. (See page 25 for more information on government policy trends.)

- **EMPLOYEE/OCCUPANT SATISFACTION AND PRODUCTIVITY IMPROVEMENTS: Even though only 8% select employee/occupant satisfaction as a major influence, 33% report that these factors have a good deal of influence.** The contrast between the percentage who find these factors influential and those who consider them a *major influence* correspond to the high importance of increased productivity and satisfaction and to the difficulty of measuring the impact of efficiency on these factors. Even slight productivity increases can yield financial paybacks that far outweigh the financial impact of the other benefits. However, it hard to connect satisfaction/productivity measures directly to efficiency improvements.

These results indicate that making a strong business case for energy efficiency involves promoting several different factors simultaneously. All but one of the categories are selected as influential by over 50% of the respondents, which indicates that multiple factors, rather than just one, are considered in energy efficiency investment decisions.

Influence Factors Behind the Business Case for PAST Energy Efficiency Retrofit Activities

Source: McGraw-Hill Construction, 2011



VARIATION BY SECTOR

- **Healthcare: The healthcare sector finds improved asset value and improved productivity to be more important than other industry sectors do—57% affirm that asset value and productivity improvements have a good deal of influence or a major influence, which is considerably higher than the overall rating for each category.**

- **Education: Market differentiation carries greater weight in the education sector than it does in other industry sectors—68% report this to have a major or a good deal of influence versus 45% overall. Colleges and universities, in particular, are highly competitive and need to distinguish themselves to potential students and donors.**
  - Institutions with strong environmental credentials are actively sought by the current generation entering college, and college rankings are in part based on the difference between the number of students who apply and the number accepted.
  - Colleges and universities also need to be recognized as good financial stewards to potential donors and offer the perception that donations are focused on important programs and not wasted on needlessly high utility bills.

CONTINUED

Influence Factors for Adoption of Future Efficiency Projects

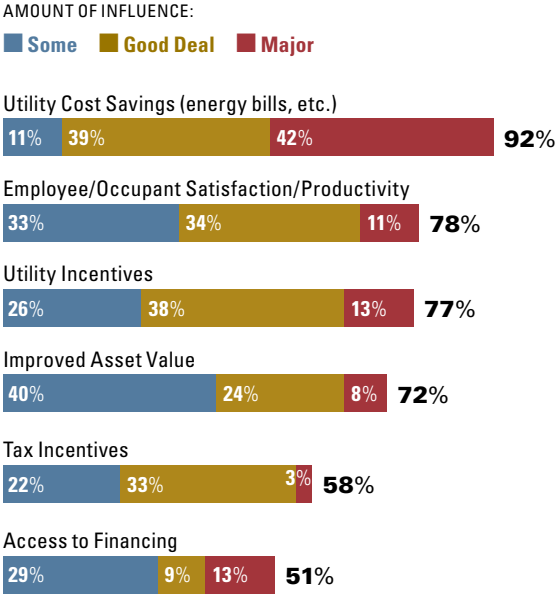
The business case for future investments in energy efficiency is multifaceted, with all factors selected by over 50% of the respondents as having at least some influence on their decision on future energy efficiency retrofits. Making the case for additional energy efficiency projects can be done best by emphasizing cost savings, but the strongest case will also address the impact on the buildings and their occupants, as well as making the initial investment capital easier to secure.

- **UTILITY COST SAVINGS:** Just as utility cost savings were a critical factor that influenced past decisions to undertake energy efficiency upgrades (see page 22), 91% of the firms surveyed expect them to be a strong influence in the future. In fact, almost half (42%) regard utility cost savings as a major influence—a higher percentage by a factor of more than three over any other influence.

- **OTHER FACTORS SELECTED BY MORE THAN 70% OF RESPONDENTS: Utility incentives, employee satisfaction and productivity, and improved asset value are also considered influential by more than 70% of the respondents.**
  - Employee and occupant satisfaction and productivity offer better returns than simple cost savings for firms.
  - Utility incentives, by saving money up front on the initial investment, help firms get past the challenge of finding the capital for the initial investment. This may explain why they are considered influential by a higher number of respondents as compared to the influence of tax incentives.
  - Improved asset value is expected to influence the business case by more firms in the future than have been influenced by it in the past. 72% report it as influential on future activities, as compared to 63% on past activities. This differential may be due to more available information on the performance of efficient buildings relative to their overall market.

Influence Factors Behind the Business Case for FUTURE Energy Efficiency Retrofit Activities

Source: McGraw-Hill Construction, 2011



- **ACCESS TO FINANCING: While a lower percentage of firms consider financing influential, 13% consider it a *major influence*—a percentage only exceeded by cost savings and equal to utility incentives.** Like utility incentives, access to financing will reduce the burden of finding the initial investment funds for future projects. However, the access to financing through traditional institutions like banks is currently limited. (See the data section starting on page 46 for more information on financing energy efficiency.)

The Role of Energy Service Contracts

Current Market and Future Outlook of the Use of Energy Service Companies (ESCOs) to Improve Energy Efficiency in Buildings

For high-performance retrofits, ESCOs are a one-stop shop. Energy service companies develop, execute and fund modernization plans, and their compensation, in turn, is tied to the operations-and-maintenance (O&M) savings of the resulting improvement in performance. In so doing, they take on all of its technical and performance risk, and thanks in part to that circus-tent approach, they are growing the energy efficiency market.

According to research recently released by the Lawrence Berkeley National Laboratory, the ESCO industry's aggregate revenues totaled $4.1 billion in 2008, a 7% increase over 2006. The report also forecasts total revenues between $7.1 billion and $7.3 billion in 2011—a 26% annual increase. Currently three quarters of this activity enhances energy efficiency, with a remaining, smaller focus on renewable power generation. Occasionally, these projects are termed managed energy service agreements.

The Biggest Losers

The so-called MUSH market is responsible for the vast majority of ESCO activity. MUSH stands for municipal and state governments, universities and colleges, K–12 schools, and hospitals, and the market comprised 69% of all ESCO business in 2008, according to the Lawrence Berkeley study. Because the ESCO business model is based on long-term performance contracts—capital investments are captured by energy savings over a predetermined period—it requires clients like MUSH owners who are committed to operating subject properties for equally long time spans.

Among federal agencies, Energy Savings Performance Contracts (ESPCs) allow federal agencies to work with preapproved ESCOs to launch high-performance retrofits without up-front investment or congressional appropriation. In late 2008, for example, the U.S. Department of Energy (DOE) awarded 16 ESPCs as part of an indefinite-delivery, indefinite-quantity (IDIQ) contract. As of March 2010, 25 federal agencies had launched more than 550 ESPC projects worth approximately $3.6 billion. The 2008 IDIQ alone could save as much as $80 billion in energy costs. Also, there are "qualified ESCOs," which are not IDIQ-contracted but have been screened by a board comprising representatives from DOE and the Federal Energy Management Program.

The U.S. Department of Defense is responsible for approximately 70 percent of ESPC work because the military views inefficiency as a liability. Fuel transport puts troops in harm's way, for example, so actively embracing self-funded retrofits can potentially save lives. Increasingly stringent energy- and emissions-reduction goals, like those stated in Executive Order 13514 (see page 25 for more information), will boost ESPC engagement in the federal sector, while Recovery Act funding is helping ESCOs secure more business in both the MUSH and federal markets.

Increasing the Pie

Industry groups are trying to make it easier for the commercial market to partner with ESCOs. Groups like the U.S. Green Building Council (USGBC) are advocating for revision of the $1.80-per-square-foot commercial building tax credit to encompass service agreements. "There's even some talk about more foundational moves. Green appraisals would help energy-efficient retrofitting to take off, because you'd know that your building is being appraised according to appropriate comparables," says Jason Hartke, the USGBC's vice president of national policy.

What is certain is that the field will continue favoring large, well-capitalized companies like Honeywell and Johnson Controls. "Contracts used to pay the ESCO over time as savings were realized, and that format proved very expensive for customers. Today, because the ESCO regains its capital cost at the end of the contract, the ESCO is liable for the agreed savings for the life of the contract," explains National Association of Energy Service Companies president Donald Gilligan. And although Gilligan knows of very few instances in which the agreed-upon savings did not materialize, "only large companies can bear the costs and time frame of project development, and only they have the balance sheets required to secure the savings guarantees." ■

Financing Energy Efficiency Activities

Means of Financing Improvements

- **CAPITAL BUDGET/COMPANY PROFITS: 85% of energy efficiency projects were funded through capital budgets and company profits.** Therefore, investment in energy efficiency must compete with other priorities for a company's limited pool of capital. For more comprehensive efficiency improvements to occur, other sources of funding must be developed. (See data section starting on page 46 for more information on financing energy efficiency.)

- **SAVINGS RESULTING FROM ENERGY EFFICIENCY EFFORTS: 56% report directly financing retrofit projects using the energy efficiency savings that result from the retrofit.** This is consistent with the fact that for leaders in corporate America, the key benefit of green retrofits is the resulting utility savings.

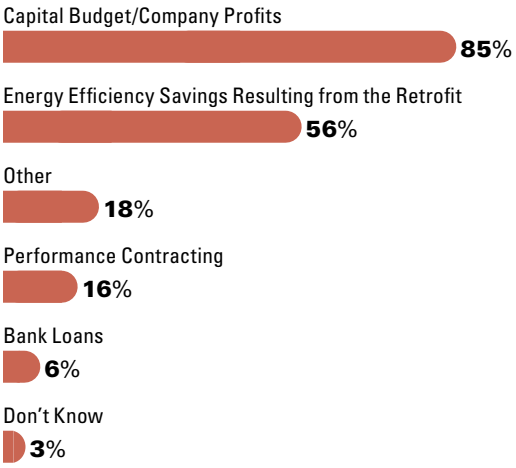
- **PERFORMANCE CONTRACTING: Performance contracting, at 16%, is still a relatively small part of financing for energy efficiency in the private sector.** By redistributing the performance risk, performance contracting has the potential to help owners who are not well positioned to make efficiency investments. (See page 22 for more information on performance contracts.)

- **BANK LOANS: At 6%, bank loans have not been an important factor in the financing of energy efficiency efforts to date.** This can be attributed to a few factors, including:
  - Tightening of bank credit after 2007
  - Relatively low cost of many typical energy efficiency updates like lighting upgrades

  However, if more extensive energy efficiency improvements are to be made to a wider percentage of the current building stock, bank financing may need to play a larger role.

Means of Financing Energy Efficiency Improvements

Source: McGraw-Hill Construction, 2011



- **UTILITY AND GOVERNMENT INCENTIVES:** Although it was not a choice offered in the survey, several respondents volunteered utility and government incentives—including rebates and tax incentives—as a source of financing for energy efficiency projects. The fact that these were volunteered as top-of-mind suggestions demonstrates the impact government can have on increasing energy efficiency investment in the private sector.

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Financing Energy Efficiency Activities CONTINUED

Financing Energy Efficiency versus Green Retrofit and Renovation Projects

The data on financing from MHC's 2009 *Green Retrofit and Renovation SmartMarket Report* reveals that green retrofit projects rely somewhat more on bank financing and less on capital budgets/company profits or cost savings compared to energy efficiency projects.

- **BANK LOANS: 19% for green as compared to 6% for energy efficiency projects**
- **ENERGY EFFICIENCY SAVINGS: 41% for green, compared to 56% for energy efficiency**
- **CAPITAL BUDGETS/COMPANY PROFITS: 54% for green, compared to 85% for energy efficiency**

This comparison is particularly striking since 2008 and 2009 were the nadir for banks issuing loans, and in the time between the 2009 study and this one at the end of 2010, the conditions for obtaining a bank loan for construction projects had slightly improved.

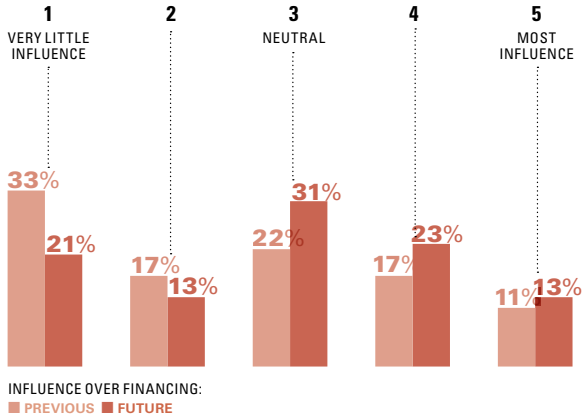
Incorporating energy efficiency as part of green retrofits may be a way to open up projects to financing opportunities beyond capital budgets and company profits, offering the potential for increasing the overall market for these upgrades.

VARIATION BY SECTOR

Education: 37% of the education sector used performance contracting to help finance their energy efficiency upgrades, more than double the amount of any other sector covered in the survey. Schools are good candidates for performance contracting because their long-term ownership allows them to see the long-term benefits of the efficiency retrofits after the performance contract expires.

Influence of Chief Sustainability Officer on Future Financing Decisions

Source: McGraw-Hill Construction, 2011



Influence on Financing by Role

Chief sustainability officers (CSOs) have significant influence on financing decisions for investment in energy efficiency. In fact, they report increases in their influence, from 28% having high levels of influence in mid-2009 to 46% having high levels at the end of 2010.

At the very highest levels, corporate officers, such as CEOs and COOs, had the highest levels of influence on financing decisions.

This finding is encouraging for making the case on energy efficiency. Since CSOs are becoming more common in the largest corporations and they are receptive to discussions on green, sustainability and energy efficiency, their increasing influence on financial investment decisions means that they can more easily advocate for increased levels of energy efficiency activities. (For more information on the role of the CSO, see page 34.)

Sidebar:

Government and Utility Policies and Incentives for Energy Efficiency and Green Building

If passed as prosed, the Obama administration's new Better Buildings Initiative will play an important role in improving energy efficiency in the United States. However, efficiency initiatives are not new. Several were put in place by George W. Bush's administration, and they usually attract strong bipartisan interest. To see significant improvement in building stock performance, government must play a role in encouraging efficiency.

Energy Independence And Security Act (EISA) of 2007

Although it is predated by several executive orders and pieces of federal legislation, the EISA provides a foundation for the sustainable design movement, including a definition for high-performance green building.

EISA also increased the rate of required reduction in total energy consumption of federal buildings to 30% by 2015, and required new construction and major renovations to attain net zero by 2030.

Moreover, EISA required the U.S. General Services Administration (GSA) to establish an Office of Federal High-Performance Green Buildings to coordinate activities relating to such buildings across federal agencies, and to coordinate with the U.S. Department of Energy's (DOE) Office of Commercial High-Performance Green Buildings, also mandated by the act.

Laying The Groundwork For ARRA

Two prongs of EISA got a big boost from the American Recovery and Reinvestment Act (ARRA) of 2009. GSA's Office of Federal High-Performance Green Buildings played an integral role in the agency's allocation of ARRA funds to high-performance modernizations of its existing inventory. ARRA dedicated $5.5 billion to GSA, and $4.5 billion of that had to be earmarked for building upgrades; funds were entirely allocated. These efforts have dovetailed with an adjunct effort, launched by Administrator Martha N. Johnson in early 2010, to aim for "Zero Environmental Footprint." GSA manages 362 million square feet of federal workspace, or approximately 6% of all federal square footage.

EISA also authorized the Energy Efficiency and Conservation Block Grant (EECBG) Program, and the ARRA funded EECBG for the first time. It is modeled after the Community Development Block Grant program administered by the U.S. Department of Housing and Urban Development and allows localities to invest in energy efficiency retrofits and other projects, mostly through formula grants. ARRA allocated $3.2 billion for EECBG.

State Spending under ARRA

Of the approximately $16 billion in ARRA funds dedicated to clean energy and energy efficiency, $3.1 billion was channeled to state energy offices. State sources and private-sector contributions bring the total investment to $7.8 billion. The State Energy Program redoubles the efforts of EECBG by providing financial and technical assistance to states through formulas and competitive grants—for strategic development and products and technologies, respectively.

ARRA has successfully motivated states to create long-term funding mechanisms. In particular, many states have applied for ARRA funding to set up revolving loan funds, which are not subject to expiration as long as the entire allocation is loaned in three years. There are 65 funds, available in 34 states, worth approximately $930 million.

Growth in revolving loan funds was just one prong of significant activity among states and utilities in energy efficiency. According to the Consortium for Energy Efficiency, energy efficiency program budgets in 2010 reached $5.5 billion in 2010, up more than 20% from 2009. The year also saw passage of mandatory energy efficiency resource standards in Arkansas and Wisconsin, meaning that a majority of states now have such standards on the books.

Non-ARRA Activities at the State and Local Level

In addition to the activities encouraged by ARRA, many states have major initiatives of their own to encourage energy efficiency. Strategies range from tax credits to reduced project costs:

- **TAX CREDITS/ABATEMENTS: States like NY and MD have legislation for tax incentives for efficiency retrofits or use of renewables. Even more aggressive action has taken place at the local level. For example, Cincinnati, Ohio, has a tax abatement program of 75% off the added value created by the renovation, which they estimate has over $60 million in private investment.**

- **GRANTS: Grants are also occurring at the state level, such as the**

grants offered by the states of Washington and Illinois, and at the local level. Many of these are initiated in partnership with local utilities, such as the Puget Sound Energy (PSE) Business Energy Management Retrofit Grants, which pay for up to 75% of the cost of efficiency retrofits.

- **LOANS: Inexpensive financing is offered by several states, including Wisconsin and Florida and at the local level. For example, Chula Vista, California, offers 3% financing for qualified retrofits.**

- **REBATES: Many rebates are offered through utilities for installation of energy-efficient equipment. The state of Louisiana has a direct rebate program that offers up to $5,000 back on projects that increase efficiency by 10% or more.**

Federal Efficiency Initiatives Beyond ARRA

One of the most critical federal efforts to advance energy efficiency is Executive Order 13514. Signed almost eight months after passage of ARRA, EO 13514 expands upon the sustainability goals of EO 13423; they include 26% potable water reduction by 2020 and 100% net-zero new construction of federal facilities by 2030.

As per EO 13514's deadline, in January federal agencies provided the White House with inventories of greenhouse gas emissions at Scopes 1 (direct), 2 (indirect) and 3, and must also file Strategic Sustainability Performance Plans annually hereafter. The order's recognition of Scope 3 greenhouse gas emissions is notable, especially because of the acknowledgement of the carbon footprint of building materials' extraction and distribution, in addition to agency activities more typically referenced under Scope 3 like transmission and distribution losses, business and commuter travel, and waste removal.

The White House has released a report surveying how agencies are striving toward EO 13514 standards already. It includes several brief case studies including two major renovations—GSA's modernization of the Edith Green/Wendell Wyatt Building in Portland, Oregon, and of an IRS service center in Andover, Maryland. Respectively, these projects are expected to achieve energy consumption that is as much as 65% less than comparable office buildings and to reduce overall energy use by more than 25%.

Looking Forward

The new Better Buildings Initiative proposed by the Obama administration promises to help increase investment in energy efficiency by addressing shortfalls in existing efficiency policies and following models that have proven successful in other initiatives.

One goal of the initiative is to achieve 20% improvement in energy efficiency in commercial buildings by 2020. The White House predicts that the improved efficiency will reduce commercial energy bills by $40 billion per year and view this as part of its plans to stimulate the economy.

Key initiatives include:

- **Implementing Tax Credits rather than Tax Deductions for Efficiency Improvements.** As the data in this report demonstrate, financing is a critical obstacle to increasing efficiency investments. Tax credits can more easily be used as collateral and are easier to recognize in ROI than tax deductions. The administration suggests that this change alone could account for a tenfold increase in efficiency activity.

- **More Financing Options through the Small Business Administration and the Department of Energy.** The Small Business Administration already has a successful loan program for financing efficiency, and the administration proposes to expand that effort. The U.S. Department of Energy will also conduct a pilot program to guarantee loans, which could make the credit rating for small and medium-size businesses far more appealing to banks. (See page 46 for more information on how guaranteed loans could increase efficiency activity from the point of view of leaders in sustainable banking.)

- **Race to Green.** This program uses the highly successful Race to the Top school initiative to encourage communities to develop their own creative ways to encourage efficiency. Grants will be awarded to the most promising proposals.

- **Better Buildings Challenge.** This program will encourage CEOs and university presidents to commit to efficiency by offering incentives like public recognition and technical assistance.

- **Training Next Generation of Skilled Workers.** In addition to providing more workforce training, this program also seeks more transparency around energy performance in buildings. ■

Business Benefits from Sustainable Activities

Corporate leaders across the U.S., including those at the largest corporations in America, as well as education and healthcare owners, all expect business benefits from sustainability activities.

Operating Cost Decreases

Nearly all (98%) expect to see drops in energy and operating costs. This is a significant increase compared to their expectation just 18 months ago. In 2009, only 71% of this same population of respondents expected to see operating cost decreases.

This suggests that corporate leaders are setting higher expectations, something that industry players will need to be mindful of.

EXPECTED OPERATING COST DECREASES

Overall, there has been little change in the level of decrease expected in operating costs as a result of sustainability initiatives. Nor has there been much difference by size of the building or the type of respondent.

ABILITY TO MEASURE BENEFITS

One thing that did change dramatically was the ability to measure those reductions. More than double the number of firms in 2010 were able to measure operating cost savings as compared to 2009—increasing to 21% from 9%. This will be very important since quantifiable savings can be a powerful tool in making and sustaining the business case for efficiency investments.

Variations by Sector

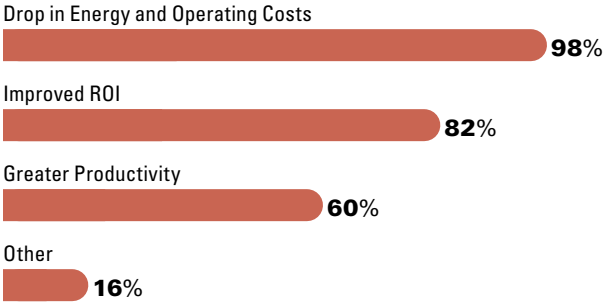
Healthcare: Firms in the healthcare sector are much more optimistic about the level of paybacks in 2010 as compared to mid-2009. Half expect savings of over 5% today as compared to just 8% expecting the same in 2009. In fact, in 2009 over three fourths of healthcare executives expected savings of less than 5%, but in 2010 those expectations improved, so that only 25% expect this lower level of paybacks.

Greater Productivity

At the end of 2010, **60% of firms expected to see an increase in productivity due to sustainability efforts**. These levels are comparable to expectations in 2009. The biggest shift in these overall numbers came in the healthcare sector—only a little over a third expected any benefit in 2009, compared with over 60% in 2010.

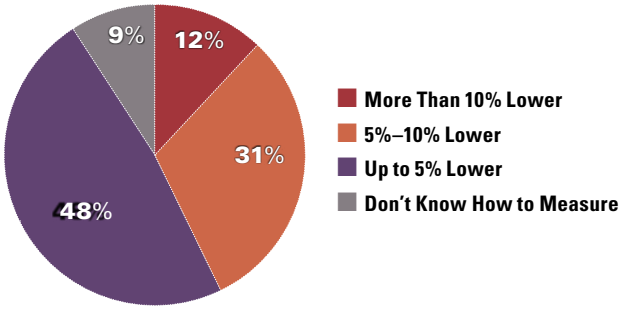
Expected Business Benefits from Sustainability Adoption

Source: McGraw-Hill Construction, 2011



Expected Operating Cost Decreases from Energy Efficiency Retrofit/Renovation Activities

Source: McGraw-Hill Construction, 2011



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Business Benefits from Sustainable Activities CONTINUED

EXPECTED PRODUCTIVITY GAINS

Overall, there has been little change in the level of productivity increase expected as a result of sustainability initiatives. However, there have been some variations by size of firm.

Variation by Firm Size

Overwhelmingly, smaller firms expect lower productivity gains—81% expect gains of 5% or less, compared to 57% of larger firms, while only 6% expect gains over 5%. In conrast, 32% of larger firms expect gains over 5%. Smaller firms also have a harder time measuring productivity improvements.

Improved ROI

82% expect higher returns on their investments. Considering that measuring ROI remains a challenge for a relatively significant population (17%), this result speaks to the higher demands that leaders are placing on sustainability.

EXPECTED ROI INCREASES

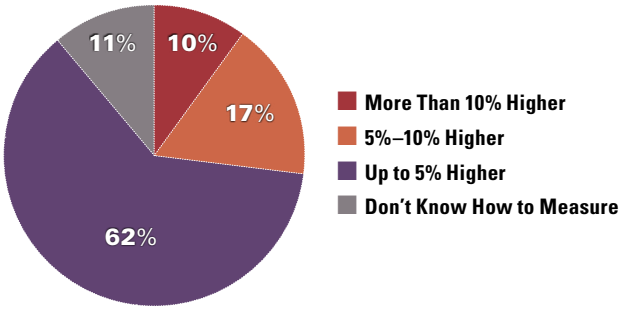
Most firms expect relatively the same level of ROI increases—regardless of size or sector.

VARIATION BY SECTOR

Healthcare: Healthcare executives have much more difficulty in terms of measurement. 25% of them struggle to measure ROI improvements, compared to only 12% in education and 17% overall.

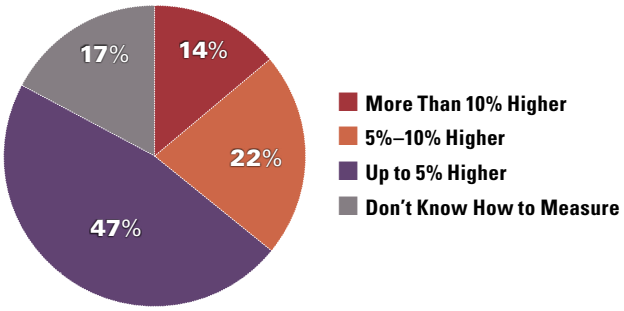
Expected Productivity Improvements from Energy Efficiency Retrofit/Renovation Activities

Source: McGraw-Hill Construction, 2011



Expected ROI Increases from Energy Efficiency Retrofit/Renovation Activities

Source: McGraw-Hill Construction, 2011



Drivers and Obstacles to Corporate Sustainability

Reasons for Investing in Sustainability

There are a number of factors that encourage corporations to engage in sustainability efforts.

PUBLIC EXPECTATION

- **Over Time:** There has been a shift in just 18 months from mid-2009 to the end of 2010 in the public expectation for corporate investments in sustainability. Today, 83% of corporate leaders believe the public expects good citizenship in the areas of sustainability and green—compared to 69% a year ago.
- **Variation by Firm Size:** A much higher percentage of large firms feel pressure from the public. This is consistent with the number of watchdog organizations and the level of shareholder attention on these companies and organizations.
- There is little variation by industry sector.

MARKET DIFFERENTIATION

Overall, there was little significant difference in perception about market differentiation—not by firm size, nor by industry sector. The only significant differences occurred over time.

- **2009 to 2010:** There has been a shift in just 18 months from mid-2009 to the end of 2010 in how much market differentiation is offered by sustainability investments—78% report it in 2010, compared with only 61% in 2009.
- **2006 to 2009:** This increase from 2009 to 2010 follows a dramatic shift in opinion from 2006, when only 31% reported an expectation of market differentiation from sustainability. This speaks to the way that these concepts are perceived in corporations today.

Key Drivers Promoting Corporate Sustainability

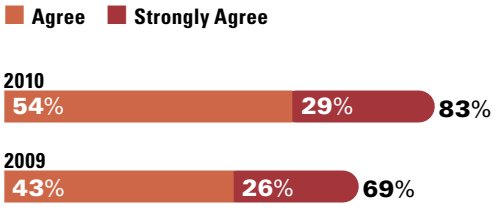
The key drivers for corporate sustainability have not changed significantly since 2009.

- **ENERGY/COST SAVINGS:** Energy and cost savings is still of primary importance at 94%. This is roughly equivalent to study results in 2006 and 2009, demonstrating the stability of this factor as the most critical driver.

Public Expects Corporations to be Good Citizens in Sustainability and Green

(Over Time from 2009 to 2010)

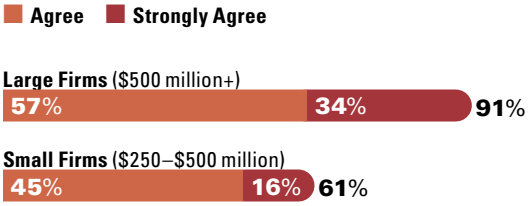
Source: McGraw-Hill Construction, 2011 (2010); *2009 Greening of Corporate America Report*, Siemens/MHC



Public Expects Corporations to be Good Citizens in Sustainability and Green

(By Size of Firm)

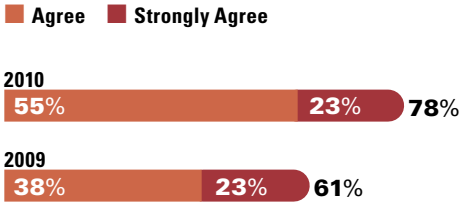
Source: McGraw-Hill Construction, 2011



Sustainability Creates Market Differentiation

(Over Time from 2009 to 2010)

Source: McGraw-Hill Construction, 2011 (2010); *2009 Greening of Corporate America Report*, Siemens/MHC



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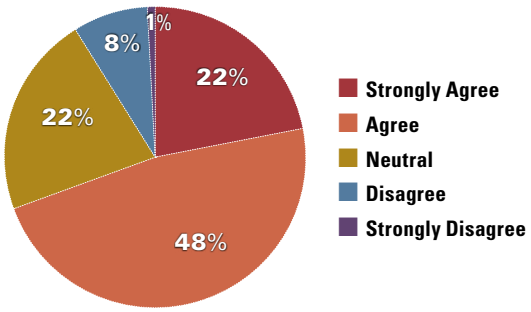
Drivers and Obstacles to Corporate Sustainability CONTINUED

- **PUBLIC RELATIONS/MEDIA:** Public relations/media coverage is now recognized by 74% as a key driver, 9% more than previously. This result demonstrates that a commitment to sustainability is increasingly perceived as a necessary part of a company's image.
- **COMPETITIVE ADVANTAGE:** Along with public relations/media coverage, the identification of competitive advantage as a driver demonstrates that companies see business benefits from positive public perception of their sustainability work.
- **GOVERNMENT REGULATION (2009)/GOVERNMENT-REQUIRED ENERGY REDUCTION TARGETS (2010):** Even though the possibility of a cap-and-trade program around carbon looks politically unlikely, the 2007 Supreme Court decision that allows the EPA to regulate greenhouse gas emissions under the Clean Air Act has been widely and publicly debated. Until the full set of regulatory rules has been established and tested in the courts, uncertainty around this area may continue to drive sustainability adoption.
- **CUSTOMER NEED:** Fewer respondents saw customer need as a major driver toward sustainability in 2010 than in 2009—60% in 2010 as compared to 67% in 2009. One factor that may have influenced this decrease is that sustainable green products and services are becoming more commonplace in the market, and firms may be engaging in sustainability efforts because of the business benefits and advantages instead of just responding to clients and the market.
- **STAFF RETENTION/TALENT ACQUISITION:** While the year-over-year change in the impact of staff on the decision to engage in sustainability is not statistically different, the increase is striking because it has occurred during a recession with high unemployment, which gives a greater advantage to the company than to the employee. In this environment, this increase suggests that employers are finding that sustainability is an important market differentiator—even for their workers.

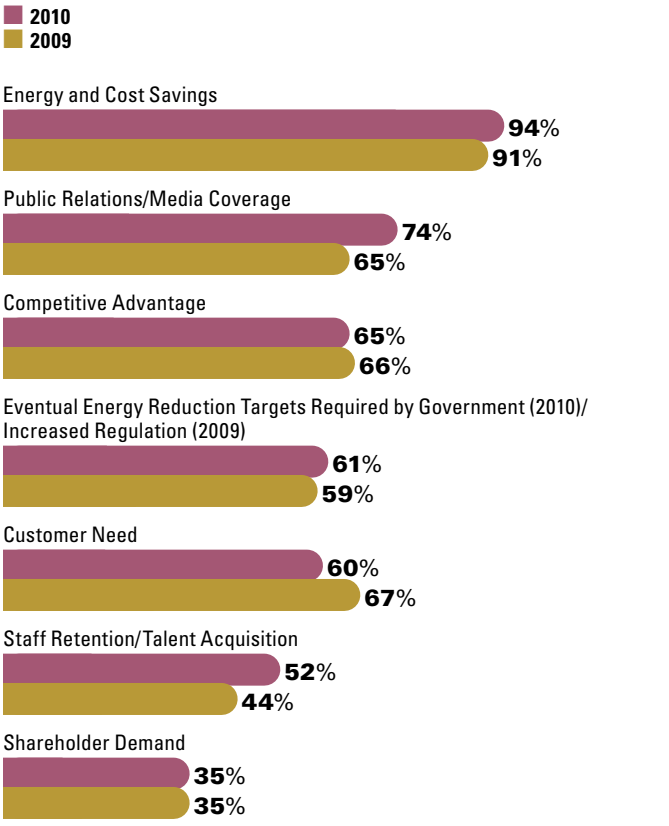
The Main Reason to Engage in Sustainability Is to Lower Operating Costs from Efficiencies

Source: McGraw-Hill Construction, 2011



Key Drivers Promoting Corporate Sustainability

Source: McGraw-Hill Construction, 2011 (2010); *2009 Greening of Corporate America Report*, Siemens/MHC



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Variation by Sector

Healthcare: A few factors are selected by a significantly higher percentage of healthcare respondents than any other sector:

- **Customer Need (75%):** Studies have found that green features like natural light and better ventilation correlate with better recovery rates for patients in hospitals.[12]
- **Staff Retention/Talent Acquisition (75%):** Unlike other fields, healthcare continues to face challenges in the area of staffing, such as the high demand for qualified nurses. This would create more sensitivity to the demands of their current and potential employees.[13]
- **Eventual Energy Reduction Targets Required by Government (88%):** Healthcare is the second most intensive commercial building sector for energy use, after food sales and service. Therefore, any required energy use reductions may be particularly costly for this sector.[14]

Variation by Firm Size (based on Annual Revenue)

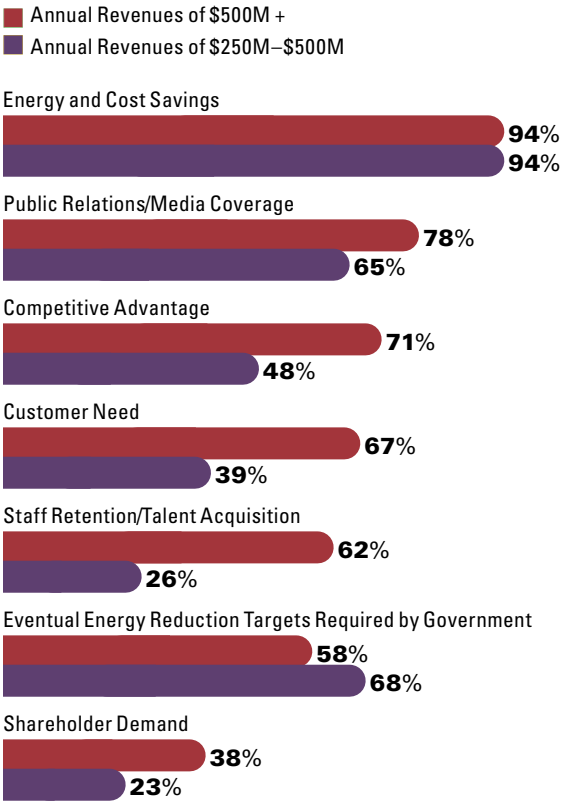
These results support the general trend that larger companies experience a greater business need to adopt sustainability as compared to smaller firms, whether that need arises from distinguishing themselves from their competition or attracting and retaining staff. Additionally, their larger investments in sustainability suggest that they are achieving greater business benefits and value these as investments in staying competitive.

Specific differences include the following:

- **Larger Firms (revenues of over $500 million):** In general, more respondents from larger organizations regard the various drivers as key to promoting sustainability.
- **Smaller Firms (revenues of $250 million to $500 million):** Small firms are more driven by government regulations. In fact, this ranks as their number two driver. Smaller firms may have fewer resources (financial and legal), which could make impending regulation—especially when it is as highly contested as the current EPA attempt to regulate greenhouse gases under the Clean Air Act—seem even more daunting.

Key Drivers of Sustainability by Firm Size

Source: McGraw-Hill Construction, 2011



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Challenges to Corporate Sustainability

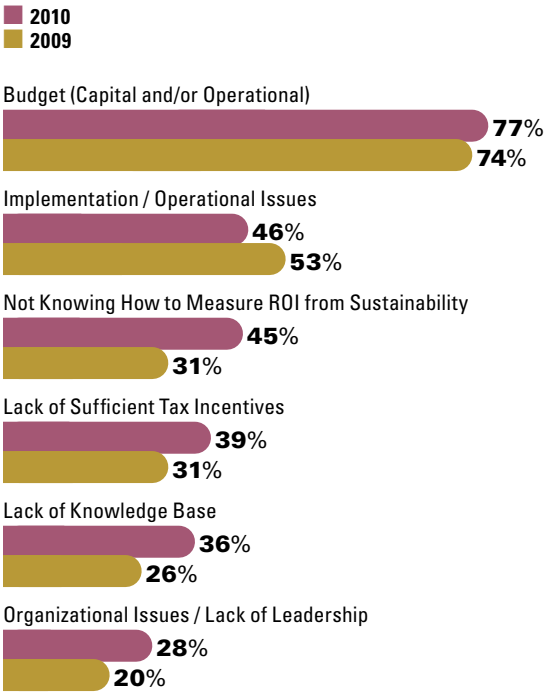
The obstacles noted in the 2006 and 2009 studies of these same corporate leaders continue to be challenges today. More firms cite most of the categories, which suggests that, as more companies actively pursue sustainability, awareness of the challenges is becoming heightened.

- **BUDGET (CAPITAL AND/OR OPERATIONAL): By far the greatest challenge is budget (capital and/or operational), cited by 77%**. This result corresponds directly with the fact that 85% of energy efficiency projects are financed through company profits or operational budgets (see page 23). As long as green and energy efficiency improvements are tied directly to budgets and available capital, broader adoption of these measures is unlikely. Concerns about budgets and costs have always been among the highest when it comes to green building as well. Perceived higher first costs were cited as a concern by the largest number of respondents in MHC's *Commercial and Institutional Green Building SmartMarket Report* (61% of respondents) and in the *Green Retrofit and Renovation SmartMarket Report* (62%). In addition, different budget accounting for green was also selected by the second largest percentage of respondents in the *Green Retrofit* report (53%) and by the third largest percentage from the *Commercial and Institutional* report (48%).

- **MEASURING ROI:** An increasing percentage of firms report concern about measuring ROI associated with sustainability as an obstacle, whith 45% of the firms citing it in the current survey compared with 31% in 2009. Many benefits from increased sustainability—including competitive advantage and employee satisfaction—are influenced by factors other than sustainability adoption. Therefore, it is very difficult to link those advantages directly to sustainability efforts. Additionally, benefits like health and productivity increases are also difficult to quantify. However, as more attention is paid to accounting for these benefits more effectively, better models may result that can create stronger arguments for investment in sustainability. Until then, utility and operational cost savings remain the most compelling argument for promoting energy efficiency investment.

Challenges to Implementing Sustainability

Source: McGraw-Hill Construction, 2011 (2010); *2009 Greening of Corporate America Report*, Siemens/MHC



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■ **IMPLEMENTATION/OPERATIONAL ISSUES:** The only factor that was perceived as an obstacle by a lower percentage of firms is implementation and operational issues, which declined from 53% in 2009 to 46% in 2010. As expertise surrounding implementation of sustainable programs in companies grows with broader adoption, it is not surprising to see that this problem has begun to recede.

Variation by Sector

While all sectors consider budgets to be the major problem, the education respondents are nearly unanimous in selecting budget as an obstacle.

- **Education:** 95% report that budget is an obstacle to sustainability adoption, compared to 77% of total respondents. The recession has been particularly difficult on education financing, due to radical cuts in state and city budgets, and private universities still recovering from large drops in the value of their endowments. Concerns about finding capital for sustainability may be partly responsible for the increasing pursuit of alternative financing like performance contracting in the education sector.

Limiting Factors

UNDERSTANDING AND MEASURING BENEFITS

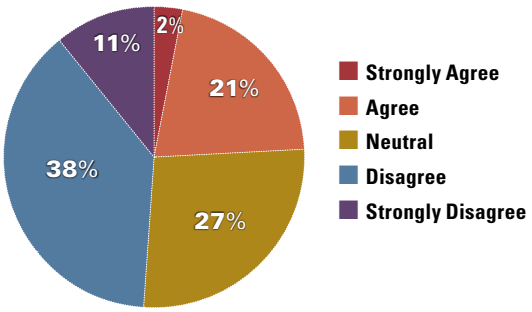
Today, nearly two thirds of respondents report that they lack understanding of how to measure ROI and other benefits from sustainability investment.

■ **Healthcare Firms: Overall, healthcare firms are significantly more challenged by their lack of understanding of the financial benefits from sustainability—38% compared to 24% overall.**

Because of the large energy and operating cost savings from sustainability, this remains the focus of healthcare firms—therefore, they have been less aware of ROI and other investment benefits. Firms in the commercial sector, however, have long had to justify ROI and other business benefits as part of their profit mission. As a result, corporations and commercial building owners likely have a longer history of performing benchmarking and measurement.

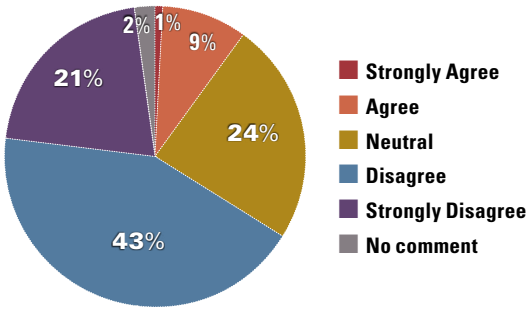
The Industry Has a Lack of Understanding on How to Measure ROI and Other Benefits from Sustainability Investments

Source: McGraw-Hill Construction, 2011



Lack of Service Providers Limits Adoption of Sustainability

Source: McGraw-Hill Construction, 2011



12 Partners Harvard Medical International. "Green Hospitals." May 25, 2009. http://www.phmi.partners.org/News/PHMI-Archive/Green-hospitals.aspx. And Martin, Anya. "Green Healing: Hospitals Taking Healthy Environments to Heart." Wall Street Journal: Market Watch. April 23, 2009. Republished at http://www.usgbc.org/News/USGBCInTheNewsDetails.aspx?ID=4055. 13 American Association of Colleges of Nursing. "Nursing Shortage." Accessed January 30, 2011. http://www.aacn.nche.edu/media/FactSheets/NursingShortage.htm. Includes data from the Bureau of Labor Statistics about the current and long term nursing shortage. 14 2009 Buildings Energy Data Book, U.S. Department of Energy, October 2009, Table 3.1.10 and Table 3.2.2 <http://buildingsdatabook.eren.doe.gov>.

Corporate Involvement in Sustainability

Levels of Corporate Sustainability Commitment

Over the past several years, corporations have regarded sustainability as a larger part of their core business than in the past and more connected to their profit mission.

This is borne out by the data collected in 2006 and 2009 in studies conducted by Siemens and McGraw-Hill Construction.

Over those three years, the shift to higher levels was dramatic, and the research findings contained in this report suggest these levels will continue to increase. Most notable were shifts at the highest and lowest levels, clearly demonstrating that sustainability is becoming part of a firm's standard way of doing business.

VARIATION BY SECTOR

- **Education:** Consistent with other findings, education institutions were more committed to sustainability in their activities. In fact, an overwhelming 71% were in the upper two stages in the Siemens/MHC study.
- **Healthcare:** While there were fewer than average firms at the lowest stages (12.5% as compared to 19% on average), 50% of healthcare institutions were at Stage 3, which suggests that while they recognize sustainability as important, they do not currently define themselves as such. However, nearly a third—32%—were in the highest two stages of the Siemens/MHC study. Considering the hurdles facing the healthcare industry, this finding is a positive sign of future investment.

Agents Influencing Sustainability Activities

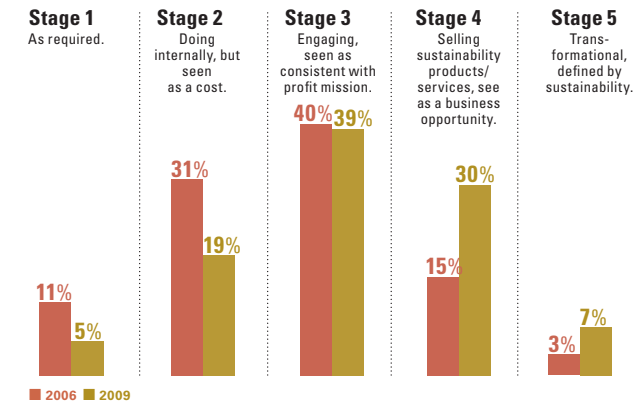
THE CHIEF SUSTAINABILITY OFFICER POSITION

In recent years, a new senior position has emerged within the executive suites of corporate America—the Chief Sustainability Office (CSO). Often, this position has been accompanied by a dedicated team focused on these issues.

- **Variation by Firm Size: Larger firms are much more likely to have a CSO or dedicated sustainability team. However, the influence of these players in larger firms have less influence than in smaller ones (see page 35).**

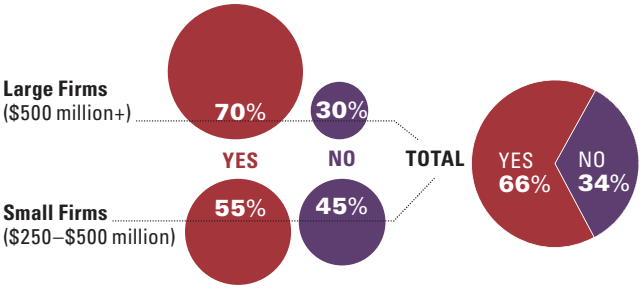
Company Involvement in Sustainabilty Over Time (2006-2009)

2009 Greening of Corporate America Report, Siemens/McGraw-Hill Construction, 2009



Firms with Dedicated Person or Team to Sustainability

Source: McGraw-Hill Construction, 2011



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Corporate Involvement in Sustainability CONTINUED

INFLUENCE LEVEL OF THE CSO

The CSO position has varying levels of influence and responsibility, ranging from a focus on marketing and public relations to influence over product and profit decisions. There has been a slight shift over the last year to higher levels of influence, which indicates that corporations may be placing more pressure on these positions to deliver business bottom-line results of sustainability efforts.

One key example of their increase in influence is their ability to control financing for efficiency projects. The CSO respondents expect their influence over financing to increase notably in the future while other corporate officers forecast little change in their influence over financing. (See page 24 for more information on the growth of CSO influence on financing.) As CSOs gain greater control over financing projects, their importance to firms seeking to do work in green and efficiency continues to grow.

OTHERS RESPONSIBLE FOR SUSTAINABILITY DECISIONS

For the most part, there is no consensus across corporate America about where sustainability decisions lie when a CSO or dedicated team is not present. Responsibility can be that of any of the following: CEO; COO; CFO; head of Environmental, Health and Safety group; VP of Human Resources; VP of Marketing; and head of Facilities Management to name just a few.

- **Variation by Firm Size: A significantly higher percentage of large firms have responsibility for sustainability decisions at the CEO level—19% versus virtually none at the smaller size. Large organizations tend to be complex, and as a result, those responsible would be more dispersed throughout the organization. Therefore, this is an important finding for the industry seeking to influence sustainability decisions since they can focus their efforts and arguments on needs of the CEO or CSO.**

Sustainability Metrics

Measuring Business Impacts of Sustainability

The industry is increasingly asking for proof of results. Metrics around the business benefits of sustainability are becoming more important as a result.

In fact, in just 18 months—from mid 2009 to the end of 2010—significantly higher numbers of metrics were used across the board to determine the effectiveness of sustainability investments.

These metrics are being used by firms of all sizes, unlike other sustainability activities.

VARIATION BY METRIC TYPE FOR INDUSTRY SECTORS

While all industry sectors are following the trend above, there are particularly compelling changes in education and healthcare firms that are now measuring emission reductions and tracking LEED certified green building activity. In fact, that activity more than doubled for both education and healthcare firms.

Tracking the Soft Benefits of Sustainability

Soft factors—such as productivity, employee healthcare costs, absenteeism and customer loyalty—are much harder to measure but can have paybacks that eclipse those from utility savings. In fact, according to the Building Owners and Managers Association, these account for over 80% of total commercial expenditures versus under 5% for combined energy, electricity, repair and maintenance costs.

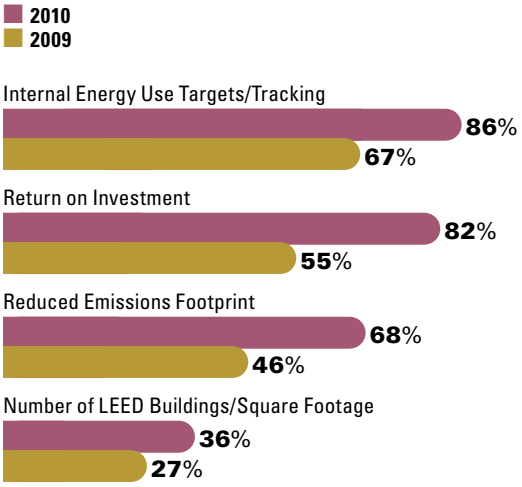
However, the challenges are evident when looking at the number of firms measuring the soft benefits of sustainability—only 18% report doing so. This is a slight increase over the 14% that reported doing so in 2009, but it is still too small to garner significant results to inform the industry. Study is needed in this area.

VARIATION BY FIRM SIZE

Smaller firms are measuring soft benefits at significantly higher rates than larger firms. This is likely due to how much easier it is for smaller firms to track individual employees, given the lower numbers.

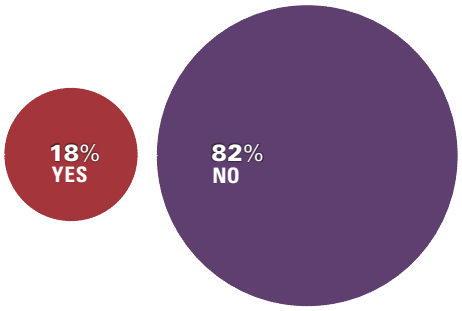
Metrics Used to Measure Effectiveness of Sustainability Practices

Source: McGraw-Hill Construction, 2011 (2010); *2009 Greening of Corporate America Report*, Siemens/MHC



Companies Engaged in Measuring Soft Benefits of Sustainability

Source: McGraw-Hill Construction, 2011



Looking Forward: Renewables and Net-Zero Energy

Support for Renewable Energy

Corporate America is in strong agreement that clean energy investments will help limit the use of fossil fuels. In fact, 60% strongly agreed, and only 2% disagreed, with this conclusion. This result is a strong affirmation of the role of renewable and clean energy sources, and it demonstrates that investment in this area, whether by private industry or by government, is critical to a more sustainable energy future, both economically and environmentally.

Most businesses recognize that increasing the percentage of energy they get from renewable sources is important. Two thirds of respondents agree that their company will benefit from increasing the percentage of energy from renewable sources.

With only 40% of firms actually benefiting from onsite renewable energy technologies or RECs (see page 18), interest is clearly stronger than activity, suggesting an opportunity for companies in the renewable market if they can price themselves competitively.

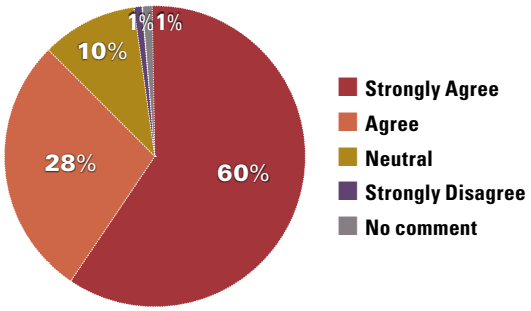
Cost is a major impediment to greater adoption of renewables. 52% of respondents strongly agree that costs have to go down to see widespread adoption, and only 8% disagree.

Despite a demonstrably strong market, the business case still requires quicker paybacks than the current price for the technology allows.

Government investment in emerging technologies can help increase the market and lower prices, as can government support of research. In addition, initiatives—such as buying power at a competitive rate from a renewable power company that installs solar panels itself on the site of a commercial property—can increase the market and lower the cost of renewables through economies of scale. (See page 40 for a description of Walmart's use of this strategy.)

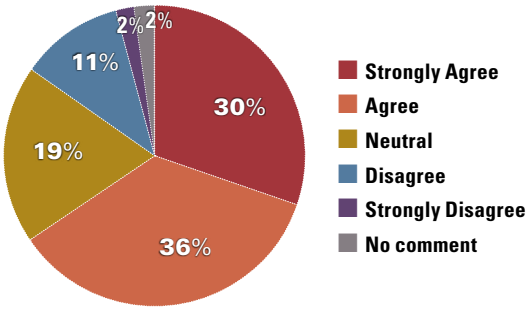
Investing in Clean Energy Will Assist in Limiting Use of Fossil Fuels

Source: McGraw-Hill Construction, 2011



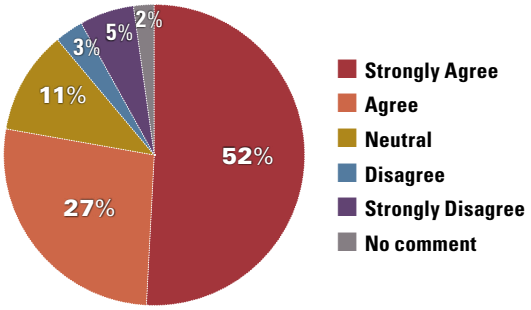
Increasing the Percentage of Our Energy from Renewable Sources Is Important for Our Company

Source: McGraw-Hill Construction, 2011



Costs of Technology Need to Go Down to Have Widespread Adoption of Renewables

Source: McGraw-Hill Construction, 2011



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Looking Forward: Renewables and Net-Zero Energy CONTINUED

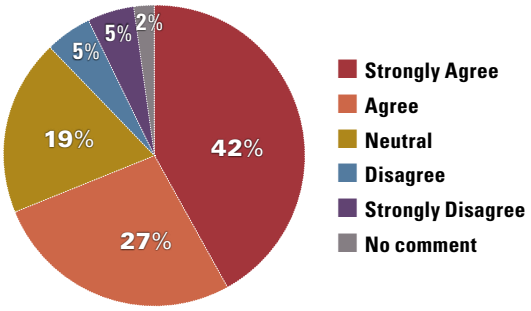
Private Industry Sees Government Incentives as Critical. 69% agree that government incentives are a critical strategy to increase the use of renewables.

These results suggest that there may be a tipping point approaching. If the industry can grow enough to be able to offer more competitive pricing—through incentives and other means of support—industry as a whole could be convinced of the value and importance of clean energy.

Eventually, government incentives could be reduced as a more mature industry provides sufficient price incentives on its own. In addition, with traditional energy prices expected to rise considerably, businesses may soon find a competitive advantage for early adoption of renewables, and that could further drive the market.

Federal Government Incentives Are Critical to Increase the Use of Renewables

Source: McGraw-Hill Construction, 2011



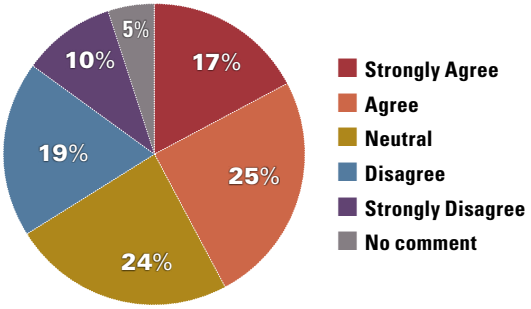
Achieving Net Zero Energy Buildings

With buildings accounting for 40% of energy use in the U.S., they are key to any strategy to reduce energy consumption. In 2007 the Energy Independence and Security Act charged the U.S. Department of Energy to achieve market-ready solutions for Net Zero Energy (NZE) commercial buildings by 2030 with the goal of converting all existing building stock to NZE by 2050. NZE buildings employ a combination of high energy efficiency measures with renewable energy to allow the building to use no more energy than it generates.

42% of the respondents find that the shift to net zero provides an opportunity for them in the market. Because survey respondents are drawn from a diverse range of business sectors, this result demonstrates that the move toward NZE is perceived as potentially good for business.

The Shift to Net Zero Provides Opportunity for Our Company in the Market

Source: McGraw-Hill Construction, 2011



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Looking Forward: Renewables and Net-Zero Energy CONTINUED

The innovation required to achieve net zero may be a strong part of the opportunity it presents. 52% of respondents disagree that current technology alone can achieve NZE. To bring the entire building stock to NZE, innovative technologies are needed that are not only highly efficient but also priced for inclusion in mundane, small retrofits.

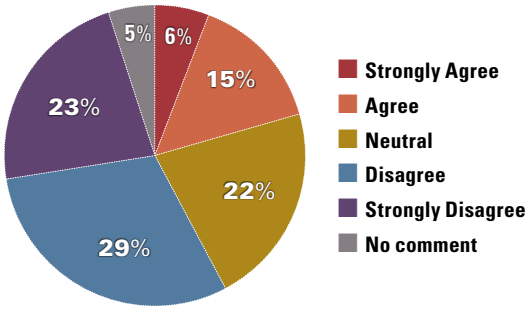
67% of respondents believe that government innovation investment is necessary to develop market-ready technologies.

Energy efficiency plays a critical role in achieving net zero. Innovation should not be confined to work with renewables, despite the importance placed on them by 66% of the respondents (see page 37).

85% of respondents, a strong majority, regard energy efficiency as the necessary first step to move buildings toward NZE. Thus, corporate America recognizes that strong investment in developing high-efficiency building products and systems is critical in order to reach NZE.

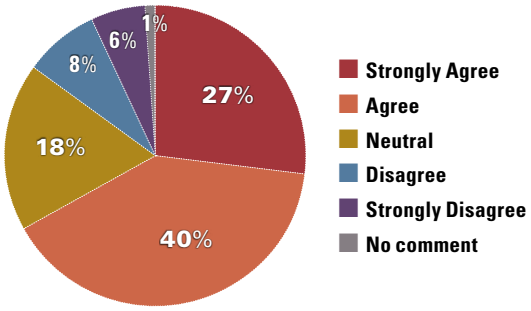
Net Zero Energy Buildings Can Be Achieved With Current Technologies

Source: McGraw-Hill Construction, 2011



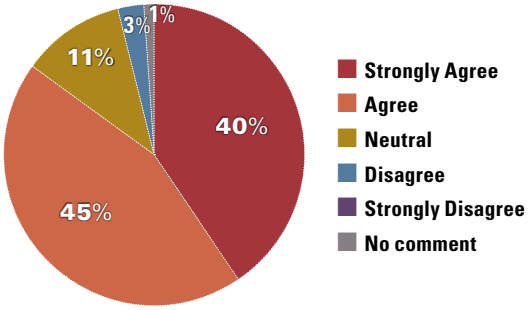
Innovation Investment from Government Is Needed for Buildings to Become Net Zero

Source: McGraw-Hill Construction, 2011



Energy Efficiency Upgrades Should Be the First Step to Moving Buildings toward Net Zero

Source: McGraw-Hill Construction, 2011



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The Walmart Example

Portfolio-Wide Use of Efficient and Green Technologies

Walmart has long been committed to improving energy efficiency and sustainability. Their efforts have been widespread, with nearly 3,000 new and existing stores incorporating green building and energy efficiency features in the last four years.

McGraw-Hill Construction (MHC) has identified the green building elements used in Walmart projects for several years. The MHC data reveal that Walmart's green technologies largely fall into three categories: energy, water and resource conservation.

As of November 2010, Walmart reported that sales in their U.S. stores had declined for the sixth consecutive quarter [15] but their commitment to incorporating green and energy-efficient technologies in their U.S. buildings has remained throughout the recession. The national scope and year-over-year commitment of their investment demonstrate that these improvements can make good business sense to a large retailer like Walmart, even in the midst of a severe economic downturn.

New and Renovation Projects with Green Building Elements

Renovation accounts for 81% of all Walmart projects in the MHC Dodge database from May 2007 through November 2010. The total includes projects in all phases of development from early planning through construction completion.

By value, they comprise 52% of Walmart's contruction activity.

These statistics demonstrate that improving existing buildings is important to Walmart, particularly since Walmart's activity is more heavily focused in renovation than the industry average. Across nonresidential building sectors, renovation projects account for 64% of the total project count and 27% of the value.

The number of new Walmart stores and additions in 2009 and 2010 that started construction held relatively steady, but that level was a significant decline compared to the projects they started in 2008. In contrast, renovation projects have been steadily increasing through that same period. This pattern is consistent with the rise in renovation work and decline in new buildings across nonresidential construction in general since the start of the recession, and it reflects a broad impulse to focus on improving existing assets as a response to difficult economic times.

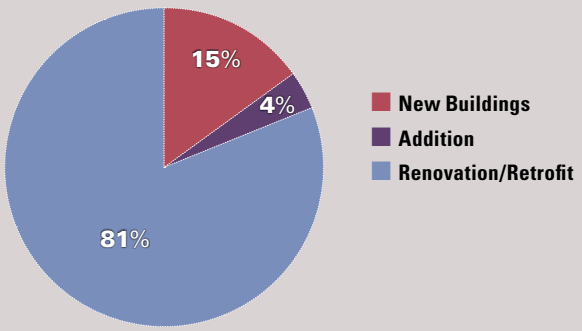
Technologies Employed by Walmart

■ **Energy Efficiency**
Features that reduce energy use are the most common green building elements used in new Walmart stores and renovations. **Light bulbs and light fixtures are incorporated in every Walmart project that includes any green technologies.**

Unlike lighting, the other technologies employed by Walmart to improve building energy performance are more frequently used in new buildings than in renovations of existing buildings.

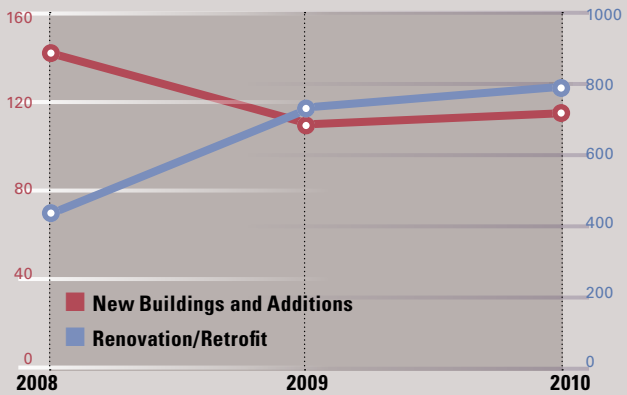
Walmart Constuction Projects

Source: McGraw-Hill Construction, 2011



Projects Started That Include Energy Efficiency Technologies

Source: McGraw-Hill Construction, 2011



15 Clifford, Stephanie. "Growth Overseas Lifts Walmart's Profits." *The New York Times.* November 16, 2010. http://www.nytimes.com/2010/11/17/business/17shop.html.

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Portfolio-Wide Use of Efficient and Green Technologies

- High-efficiency refrigeration:
  - 83% new/addition
  - 17% renovations
- Thermal water tanks:
  - 91% new/additions
  - 9% renovations
- Refrigerated case doors and daylight dimmers:
  - 92% new/additions
  - 8% renovations
- Skylights:
  - 94% new/additions
  - 6% renovations

Despite the use of these features in a relatively low percentage of renovation projects, the high volume of renovation work conducted by Walmart means that each technology has been included in approximately 70 to 120 buildings updates constructed or planned over the last few years. However, this penetration is minimal compared to the new construction projects that incorporate these features, numbering over 500 for each.

■ Renewable Energy

Walmart has invested broadly in solar panels and wind power, with these features included in over 480 new building or renovation projects since May 2007.

In addition, in 2007, Walmart initiated a program to allow green power companies to install solar panels on their buildings in California and Hawaii[16] and bought the power produced from those companies at significantly reduced rates.[17] These solar panels do not appear in this data because they were not installed by Walmart, but this practice demonstrates one non-traditional method for reducing their energy expenditures and carbon footprint.

■ Water and Other Green Technologies

Walmart is also investing in conservation and onsite stormwater management.

- **Low-flow fixtures**, like low-flow toilets, are included in nearly every project that incorporates any green features, totaling over 2800 new and renovation projects.
- **Green infrastructure methods like bioswale and pervious pavement** allow sites to absorb excess stormwater, which helps regenerate the water table and reduces the demand on local water treatment facilities. Like the energy efficiency measures other than lighting, these features are usually found in new projects rather than renovations.

Walmart also requires the use of recycled concrete for flooring and recycled plastic in many of its newly constructed stores. The focus on resource conservation demonstrates that, when it comes to new construction, Walmart is engaged in sustainable efforts beyond those that reduce utility bills.

Green Building Elements
(Renovation Projects Only)

Source: McGraw-Hill Construction, 2011

■ Energy Efficiency Technologies
■ Other Green Technologies

Renovation Projects Only	
Lightbulbs	2,388
Light Fixtures	2,386
Low-Flow Fixture	2,297
Refrigeration	108
Recycled Concrete for Flooring	65
Recycled Plastic	54
Thermal Water Tank	54
Refrigerated Case Doors	44
Recycled Mulch	42
Bioswale and Pervious Pavemen	42
Daylight Dimmers	40
Skylighting	27
Wind Power/Roof Mounted Solar Panels	26

Energy Efficiency Technologies in New and Existing Buildings (2008–2010)

ALL PROJECTS WITH ENERGY EFFICIENCY TECHNOLOGIES OTHER THAN LIGHTING

As demonstrated above, energy efficiency technologies other than lighting are normally included by Walmart on new construction projects, but only rarely in renovations.

Therefore, it is not surprising that their decline in use from 2008 to 2009 corresponds to the decline in overall new Walmart construction projects.

However, that trend does not hold true for all efficiency technologies from 2009 to 2010. Walmart continued its investment in refrigerated case doors, high-efficiency refrigeration, thermal water tanks and daylight dimmers at high levels.

16 *Solar Power Fact Sheet*. Walmart. September 1, 2009. http://walmartstores.com/pressroom/FactSheets/#Sustainability. 17 Gunther, Marc. "Wal-Mart: Here Comes the Sun." *Fortune Magazine*, posted on CNNMoney.com. May 9, 2007. http://money.cnn.com/2007/05/07/news/companies/pluggedin_gunther_wmtsolar.fortune/index.htm

case study

Portfolio-Wide Use of Efficient and Green Technologies

However, the use of daylight dimmers and skylighting decreased, again consistent with the downturn in new construction, where these features are more likely to be used.

This pattern of investment is typical during an economic downturn. Many companies, operating under more limited margins, focus their capital expenses on areas that can achieve the highest level of return for the investment. Skylights and daylight dimmers do not provide as strong a benefit in retail as they do in other sectors, such as offices, health care and manufacturing, given how these different spaces are used and occupied. In fact, natural light has been demonstrated to offer productivity and employee satisfaction benefits for offices that are as important as the reduced energy use they also provide.

However, a retail business, with customers coming and going all day, would find these additional benefits diluted, and limited resources may focus the investment on areas with the greatest returns.

RENOVATION PROJECTS WITH ENERGY EFFICIENCY TECHNOLOGIES OTHER THAN LIGHTING

There were fewer than 20 renovation projects that started in any particular year with any one of these technologies. However, unlike their use in new projects, investment in all of the energy efficiency technologies, other than lighting and refrigeration, saw a peak in 2009. The number of projects in 2010 with all of these features has dropped significantly despite growth in the overall number of renovation projects that year. Thus, the only green features that the vast majority of Walmart alteration projects incorporated in 2010 were lighting and low-flow fixtures. As the economy improves, it will be worth tracking whether Walmart increases the breadth of its green investments in the existing building projects it undertakes.

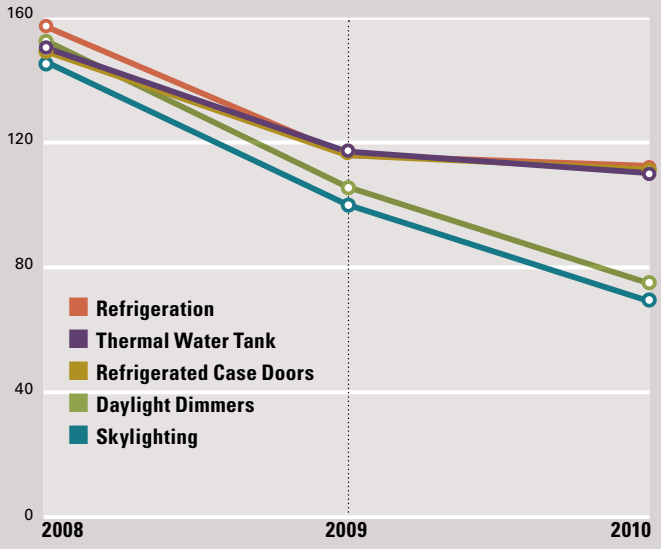
The reduced investment in most of these technologies is confined to renovation projects, which have grown overall. Their new projects have declined overall, but they still continue to include a high level of investment in multiple energy efficiency technologies. Most companies have found lighting and low-flow fixtures to be relatively inexpensive to install relative to the results they produce.

Influence on Emerging Technologies

Walmart's adoption of renewable technologies, especially solar panels, suggests the influence that a major retailer can have on the market. To date,

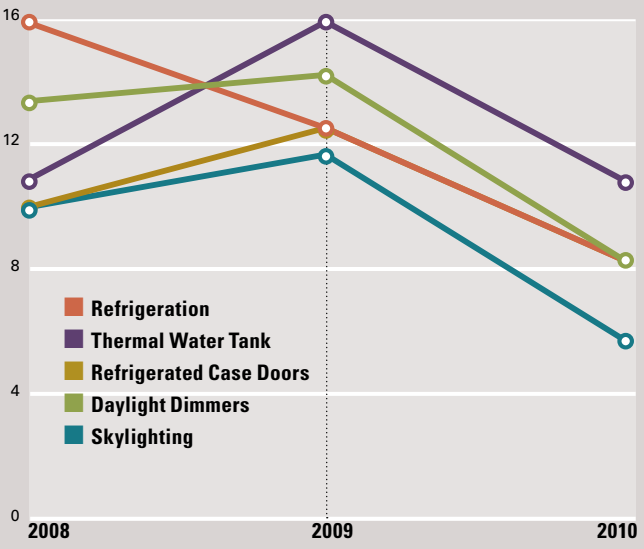
Energy Efficiency Technologies Used
(All Projects)

Source: McGraw-Hill Construction, 2011



Energy Efficiency Technologies Used
(Renovations Projects Only)

Source: McGraw-Hill Construction, 2011



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Portfolio-Wide Use of Efficient and Green Technologies

on-site electricity generation has been adopted for only a small percentage of projects nationwide.

Therefore, commitment to such efforts by a large retailer like Walmart has the potential to help drive onsite renewable energy generation, which to date has had minimal market penetration.

WALMART'S SOLAR ENERGY INVESTMENTS

Walmart's two-pronged approach of including solar on some of their own building projects while also having energy companies install units and sell them the electricity has increased their total contribution to solar power generation.

In 2007, they purchased solar power from energy companies who installed solar panels on the roofs of their stores in California and Hawaii, and they followed up in 2009 with additional agreements in California.

Incentives, public policies and energy prices may have some impact on the adoption of solar technology, but Walmart's efforts may also have an effect in some markets. For example, in 2008 and 2009, the two states with the highest number of Walmart projects that included solar panels were Florida, totaling 20, and North Carolina, totaling 17.

On new stores, the solar panels would come relatively late in the construction process, making it likely that many of them on stores started in 2008 may not have been installed and generating power until 2009.

NORTH CAROLINA AND THE POTENTIAL FOR INFLUENCING THE MARKET

The Interstate Renewable Energy Council (IREC) in their *2009 Solar Market Trends* reported that between 2008 and 2009, the grid-connected PV capacity installed increased, 3,668% in Florida and 96% in North Carolina.

While that same report described significant Florida incentives that account for the extraordinary increase, no mention is made of incentives in North Carolina, despite the fact that this increase made North Carolina one of the top10 states in the country for grid-connected PV capacity.[18]

Unlike North Carolina, all of the other markets with growth in PV capacity on that scale—including New Jersey (155%), Arizona (243%) and Massachusetts (173%)—all had major incentives in place. Thus, while it is important to make clear that Walmart alone cannot be credited with growing the solar investment in North Carolina, their installations certainly would have had an impact on this relatively small market.

THE RETAIL SECTOR'S PROMISE FOR INCREASING SOLAR ENERGY GENERATION

The importance of a retailer like Walmart committing to this kind of emerging technology, does not lie in the regional impact but in the strengthening of the overall market.

Big box retail, more than any other sector, offers a strong opportunity for solar installations, due to the sheer volume of roof space available across the country. Commitment of a significant percentage of that roof space to solar energy would provide the kind of market opportunity and stability that can encourage economies of scale and lower prices.

Incentives have been demonstrated to be most effective for expensive emerging technologies like solar when they span at least five years because of the stability offered by a longer time frame. In the same way, U.S. retailers have the potential to support stable market conditions by committing to the kind of investment in solar that Walmart and a few other major retailers have made. They would in turn benefit from the competition and lower prices, as well as increased public perception of their good corporate citizenship. ■

Methodology

From May 1, 2007 through November 30, 2010, 2,935 Walmart projects with green building elements were reported in the Dodge Network. These projects span from early design to completed construction. All of the data not otherwise cited was drawn from this pool of data.

The projects listed include new construction, additions and alterations. The projects are located across all 50 states and range in estimated construction cost from $50,000 to $50,000,000.They also include all types of buildings owned by Walmart, but are primarily retail buildings.

18 Larry Sherwood. U.S. Solar Market Trends 2009. Interstate Renewable Energy Council. July 2010. http://irecusa.org/wp-content/uploads/2010/07/IREC-Solar-Market-Trends-Report-2010_7-27-10_web1.pdf.

case study

Pursuing Efficiency and Making Good Business Sense

Transwestern

STRATEGIES ACROSS THEIR PORTFOLIO

Transwestern has been effective at improving the energy performance of buildings across all the buildings they manage despite the fact that they cannot mandate changes like an owner could. However, their approach has yielded much success—including being an Energy Star Sustained Excellence Award winner for eight years and achieving LEED EBO&M certification for over 50 buildings in the past two years.

Energy Efficiency—The First Step

Al Skodowski, senior vice president of LEED and sustainability services, observes that energy efficiency makes sense because "removing or reducing cost in a business process has always been a goal of business improvement. Energy efficiency fits the bill to a T ... Energy is metered, measured and billed in such a way that people are very aware of its fluctuations in usage or cost."

Skodowski also believes that energy efficiency, as a component of sustainability, is "what our customers should expect us to implement. Today's cutting-edge practices will be commonplace in all managed properties in just a couple of years."

Building Engineers' Role—Driving Energy Efficiency

Much of the impetus for investing in efficiency at Transwestern came from opportunities spotted by the engineers responsible for the buildings. Roy Cook, managing senior vice president of engineering and due diligence at Transwestern, describes how the initiative resulted from "our regional engineering group collectively getting together and looking for opportunities to save money for our clients." He affirms, "We've always been very motivated in looking for opportunities and ways to differentiate ourselves from our competition."

Their efforts began as a grass roots campaign. Once they started to realize results in terms of savings and received recognition from the EPA, they were able to implement the programs nationally. Enthusiastic adoption is now evident company wide, according to Cook: "Our energy initiatives and what we are doing for our clients across the country are in every marketing piece," both nationally and regionally."

Convincing the Owner

Transwestern is frequently in the position of presenting the business case for energy efficiency to their clients. Once they have explored all low cost/no cost options to improve building performance, the next move is to convince the building owners that they should invest in building upgrades.

They have always found that some clients are more open than others to the idea of efficiency improvements, but recently, the biggest obstacle they have faced has been the devastating impact of the economic downturn on real estate. Cook compares the behavior of building owners over the last couple of years with their behavior in the late eighties during the Savings and Loan crisis. He states, "It is crisis management only."

OWNERS WHO DIRECTLY RECEIVE UTILITY BENEFITS

So how do they persuade owners to invest or, as Cook puts it, "educate owners ... to look outside the two- to three-year window"? Transwestern focuses on the investment benefits that are in addition to lower energy costs, namely making buildings more competitive. According to Cook, energy efficiency investments "are going to help with your rental rates because you are going to be a dollar or two below what your competition is [per square foot]." And owners get an added PR value that it's the right thing to do.

OWNERS WHO PASS UTILITY SAVINGS TO TENANTS

Energy efficiency investment matters to owners who pass utility bills onto their clients as well. Rick Walker, vice president of sustainability services, points out that it is in the best interest of a building owner to have tenants who are as financially viable as possible, and that implementing projects in their space that saves their clients money makes good business sense. He also affirms that the properties can be positioned much more strongly in their market if they can demonstrate that they are more efficient than their competition.

Benefits Achieved

Cook reports that Transwestern's involvement usually yields savings of 3%–15% on a building's utility bills. However, he also said that depending on the building, it is not uncommon for them to be able to achieve savings in the 30%–40% range.

Walker thinks that greater tenant comfort from tuning up systems to tenant needs can also yield

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Transwestern

STRATEGIES ACROSS THEIR PORTFOLIO

greater productivity benefits. That productivity gain may be hard to measure directly, but its impact is significant.

Challenges and Opportunities for Class B and C Buildings

Walker sees the true challenge in class B and C buildings, which are typically not owned by large REITs or companies. Convincing these owners to make the necessary investments to improve efficiency is a bigger challenge, not because they don't want to improve their buildings, but because they think they cannot afford it or they don't know how to proceed.

Walker points out that buildings today that have achieved the Energy Star label were already typically high-performing buildings. Due to the large number of underperforming buildings, he predicts that "the biggest opportunity for green is yet to come. Our biggest opportunity is still through energy efficiency and water [savings]."

Strategies for Achieving Better Performing Buildings

BENCHMARKING AND ENERGY STAR

A critical part of Transwestern's management strategy involves measuring the performance of their buildings and comparing it to previous performance on a monthly basis. All utility expenses like gas, water, electricity and steam are measured. This forms the basis for their savings. Walker states, "You cannot manage what you don't measure."

Cook reports that they benchmark all of their buildings in Energy Star Portfolio Manager. They have found that the Energy Star program provides a critical benchmark for their building performance compared to peers, which their individual building performance analysis cannot provide.

BUILDING OPERATIONS

Conduct Regular Tuneups

Transwestern conducts annual building tune-ups on all their properties, including envelope, HVAC and lighting inspections. These ensure that the systems are operating efficiently.

Respond to Occupant Needs

They also continually work to adapt their building operations plan to the current needs of the building's occupants. Cook describes the impact they've seen just from conducting a tenant survey once a year. Based on the survey results, they adapted the air conditioning to the needs the tenants describe in the survey. Cook estimates that this activity alone reduced their use of air conditioning 35%–40% on Saturdays. He also makes sure the tenants are aware of the savings accrued and the impact on utilities payments.

Change as Building Needs Change

Walker sees understanding the changing needs of a building as essential to efficient operation. He points out that in commercial office buildings, "spaces lease up, spaces go unoccupied." In addition, he has observed that "a 100% occupied building now may have significantly fewer people in it than were there 20 years ago." As a result, systems need to be adjusted to reflect that change, which can save energy—and money.

Identify Energy Waste Areas

Finally, Walker also advocates making sure you understand where most of the energy consumption in the building is coming from to ensure initiatives result in the biggest paybacks possible.

Technologies and Systems That Offer Greatest Paybacks

Cook and Walker find the following have been productive investments in their buildings, including lighting retrofits, cooling tower upgrades, variable speed drivers, submetering, digital building controls, and most importantly, education of staff. As Walker warns, "We are not providing enough training in the marketplace for our operating staff to understand exactly how that stuff works and how to get the most out of it."

Taking Advantage of Utility incentives

Both Walker and Cook affirm the importance of seeking utility incentives to help support investment in technology. Cook cautions, however, that they have seen pronounced regional differences in terms of being able to take advantage of the initiatives offered. He states that they have had great luck finding good incentives on the West Coast. However, in regions like the South, money put up by the utilities is frequently gone before they take advantage of it. ■

Data: Financing Energy Efficiency:

Perspectives from Banks and Real Estate Investment Firms

Use of Bank Financing for Energy Efficiency Upgrades Is Rare

One common obstacle to increased adoption of energy efficiency in the stock of existing buildings is the up-front cost. Despite the relatively quick payback for many efficiency improvements and the long-term savings they provide, acquiring the initial capital remains a challenge.

Only 6% of the respondents in the Financing Energy Efficiency Activities section on page 23 currently use loans to finance green or energy-efficient retrofits, while 85% draw directly from capital budgets and company profits. **This suggests that the market for energy efficiency is restricted by the battle for resources in the private sector.**

Impact of the Recession on Securing Financing

That battle has become more heated as the recession has reduced profitability in many sectors and left low margins for capital improvements. Despite the fact that investing in efficiency will ultimately reduce expenditures and help the bottom line, securing that initial capital for investment can be difficult.

Many factors contribute to this problem, including the owners' reluctance to incur debt and the limited availability of financing since the stock market crashed and the recession began in 2008.

Bank Financing Is Critical to Widespread Adoption of Energy Efficiency

Even as the availability of financing gradually loosens and companies regain confidence as the economy improves, there are fundamental, structural issues inherent in the way real estate is financed that stand as obstacles to significant energy efficiency investment.

If owners are confined to relying on operation budgets and company profits to finance upgrades, investment in energy efficiency is likely to remain at current levels. As a result, the widespread commitment necessary to bring all of the building stock to high levels of performance is unlikely to take place. **Financing through banks must be made more available for true market transformation to occur.**

To make the business case across all sectors and to accomplish the breadth of investment necessary, the banks' structural issues that prevent ready availability of funds must be understood and addressed. The untapped market of energy efficiency financing provides a major opportunity for banks if these issues can be addressed.

Survey of Green and Sustainability Leaders in the Financial Community

In December 2010, McGraw-Hill Construction conducted in-depth interviews with 10 leaders in green and sustainability from large and midsize banks and from real estate investment firms. (See the Profile of Firms on page 50 for more information.) All of the respondents are proponents of increasing financing for green and energy efficiency retrofits. And their perspectives are well-informed given their level of engagement in encouraging the green lending market. As a result, they do not represent the financial industry as a whole, but rather are early adopters driving increased levels of green and energy efficiency financing.

The interviews reveal how these early adopters perceive the potential market for investment in energy efficiency in buildings, explain why loans for energy efficiency improvements are so limited and provide insights about what can be done to increase the availability of financing.

Current and Expected Future Level of Demand for Energy Efficiency Financing

Nearly all the respondents from banks report seeing a strong demand for energy efficiency.

A few recognize that the primary driver is the desire for cost savings. One affirms that energy efficiency

Encouraging Broader Availability of Energy Efficiency Financing:

BUILDING OWNERS

- Make energy efficiency part of a larger focus on greening buildings.
- Provide data on building energy performance.
- Support building energy performance standards.
- Provide data on energy efficiency improvement projects.
- Capitalize on energy-efficient buildings in branding/marketing to attract potential tenants and increase rental incomes.

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comprises the largest share of the building improvements they are asked to finance. However, respondents differed on how well the demand is currently being fulfilled.

At least one respondent notes that the building owners' interest in financing energy efficiency is tempered by the lack of available financing. This statement is supported by the survey data in this report, which show that owners currently do not consider obtaining financing a major trigger for greater growth in efficiency projects in the future. **Thus, it appears that owners do not consider financing to be a strong motivator because they do not expect it to be readily available.**

None of the respondents reported seeing more demand for efficiency in a particular building type or sector, nor did they report any trends in the loan requests they receive for specific efficiency technologies.

All of the respondents from banks expect the demand for efficiency financing to grow in the near future.

The reasons provided for rising demand differ among respondents.

- Stabilization of the economy is credited for the rising demand. This was the one factor noted by several respondents.
- Large companies, especially those with sustainability officers, will drive increased demand for financing because their executives are thinking about sustainability more holistically as it relates to the entire company.
- The increasing need for upgrading older and class B properties will drive greater investment in energy efficiency, especially since those upgrades are typically investments that deliver quick returns.

The confidence in the growing demand for efficiency financing may be due to how underserved the market is now. The data in the section Current and Future Levels of Energy-Efficiency and Green Activities on page 16 provide a mixed picture of the owner's perception of market growth in the near future.

While 78% expect to do efficiency upgrades in the next two years, the level of activity as a percentage of their overall portfolio is predicted to fall back slightly from current levels. However, as demonstrated above, this result is impacted by the owners' presumption that financing will be relatively limited for these projects.

Real estate investment firms regard investments that strictly target green or high-performing buildings to be a niche market rather than a general trend.

A few observe that generally investors do not seek energy use information as a criterion for evaluating real estate investments, but they do see a few savvy investors who consider this information. **The marketing advantages of a building that is high-performing are noted by respondents as a key factor for the investors who ask for energy use information.** This corresponds with the finding on page 20 that 73% of owners consider market differentiation to influence their decision to invest in energy efficiency.

Encouraging Broader Availability of Energy Efficiency Financing:

BANKS

- Better quantify risk by increasing internal intelligence about energy efficiency projects.
- Create standardized/ simplified process for loan requests for energy efficiency.
- Alter rules/practices of adding debt to properties with a primary mortgage, especially if that mortgage has been securitized, in order to encourage lending on energy efficiency upgrades.

One respondent also describes investors who see a direct profit by purchasing "energy hogs" in order to upgrade them into better buildings and quickly increase the property value.

Advantages Offered by Providing Financing for Energy Efficiency

Respondents from investment firms see greater client investment based on the operational savings offered by energy efficiency.

Two out of three describe owners who are seeking to invest in better-performing buildings. **They note that Energy Star scores are highly valued as quantifiable, easy-to-interpret performance measurements.**

Branding and marketing opportunities are also recognized as important for owners.

Building owners who brand themselves as energy efficient and use that as a marketing tool can enhance leasing, a factor that most directly adds value to their properties.

Banks can market themselves as better citizens and build better customer relations.

Several respondents noted that a key advantage for banks when they offer financing for energy efficiency is the improvement of their relationship with customers and potential customers. One interview subject asserts that banks risk being perceived as environmentally unfriendly if they are not in this business. Additionally, banks may get left behind if other institutions create this image of corporate responsibility.

Another respondent argues that being able to build better loan terms based on improved building performance can increase the total volume of lending with that customer, creating an advantage for both the bank and the client.

Energy-efficient buildings offer direct cash flow and business case benefits.

Most of the bank respondents agree that more efficient buildings are ultimately a good investment. However, the banks' ability to fully recognize those benefits in their process for generating real estate loans is an issue that still needs to be resolved, so this benefit is tempered by the challenges facing energy efficiency loans.

Challenges to Providing Financing for Energy Efficiency

Ultimately, banks base loan decisions on factors that have historically been shown to correlate directly with the ability of the borrower to repay the loan.

For most businesses, operational savings are too small a percentage of total expenses to impact significantly their ability to pay down their debts.

- In commercial real estate, factors like location that affect occupancy rates and rents are much easier for banks to acknowledge. In fact, one respondent affirmed that **energy efficiency loans are more important from the bank's point of view because they help maintain the value of the building in the market by avoiding obsolescence, not because of the operational savings.**
- For owner-occupied buildings, multiple respondents affirm that the credit of the borrower is a much more important factor than the operational performance of the building.

Currently, most banks cannot even recognize how efficiency may impact the value of the building.

Underwriting loans is based on historical data, and currently there are insufficient data collected on energy efficiency improvements for most banks to account for the savings expected.

In fact, one respondent points out that **the nature of energy efficiency causes this problem to be even more acute because it is an estimate of what is not going to happen in the future, not an estimate of what will happen,** such as the expected energy produced by solar panels or wind power.

Banks need to be able to quantify both the savings and the risks involved in order to incorporate those factors into the value of the building, possibly even allowing them to be collateralized and improve the terms of the loan. In addition, banks need to quantify those risks and savings using their existing methodologies and software, but very few of them have the expertise or access to historical data necessary to do so.

One respondent stated that **the lack of standardized third-party due-diligence reports contributed to their inability to collateralize**

Encouraging Broader Availability of Energy Efficiency Financing:

GOVERNMENT

- Continue to offer financial incentives either directly or indirectly through utilities, focusing on those that can be directly collateralized.
- Provide loan guarantees/credit enhancements for owners undertaking energy efficiency improvements to make borrowers more appealing to banks.
- Consider revising rules governing new debt on mortgaged properties to more effectively respond to the securitization of primary mortgages.

CONTINUED

the savings of efficiency projects. Another pointed out that uncertainty about the risks due to insufficient historical data prevents banks from attempting to pool companies and properties seeking to make these investments into a bulk loan program.

A bulk loan program would be more effective because it would allow quicker loan processing and possibly better loan terms due to a standardized rather than individualized approach to the risks and rewards of energy efficiency lending.

For properties already carrying a mortgage, strict rules about additional borrowing significantly limits the financing of energy efficiency improvements.

Even if banks could recognize the value of the savings that result from energy efficiency improvements, additional debt on many commercial buildings is hard to secure, due to rules put in place after the savings and loan crisis and stricter underwriting standards that resulted as a reaction to the crash of 2008.

Many commercial real estate mortgages are securitized, so the required approval of any new debt by the mortgage holders is particularly challenging to obtain. To truly loosen the market for energy efficiency financing, these fundamental issues with mortgages and financing must be resolved.

Glossary of Terms

- **COLLATERALIZED:** The condition of a bank recognizing the value of a guarantee, rebate or other financial incentive as collateral to secure a loan when that type of incentive is not typically recognized as collateral.
- **CREDIT ENHANCEMENT:** Different strategies that can be employed to reduce a bank's concern about the risk of possible default, especially with a class of borrowers who are typically considered to be poor credit risks. Examples of credit enhancements for energy efficiency include government-backed loan guarantees and guaranteed grants by public agencies associated with the proposed upgrades.
- **SECURITIZED MORTGAGE:** A securitized mortgage is one that has been combined with other mortgages as a financial instrument that can then be sold to investors. When a mortgage is securitized, it is difficult to add additional debt because of the challenge of obtaining the approval of the multiple investors who each own a share of the original mortgage.
- **UNDERWRITE:** Formal evaluation of the lender's exposure to the risk of default if it approves a loan request.

Real estate investment advisors see the lack of transparency around building energy use and lack of clear standards as challenges to widespread investment in energy efficiency.

Investors could help drive efficiency if the energy use of each building was published. This would encourage energy use to be a factor whenever commercial real estate changed hands. One respondent expressed concern that owners with a significant percentage of low-performing buildings in their portfolio have a vested interest in keeping energy use information from being widely available and could be an obstacle to significant change in this area.

A few regions around the country, such as the District of Columbia and New York City, have begun to require public reporting of all building energy use, and wider adoption of similar policies would reduce that concern.

Investors also see owners as reluctant to part with their cash in the current, tight economic conditions.

Since the market is largely being funded out of operating expenses and company profits, this concern about investing limited funds has a particularly detrimental effect on the efficiency upgrade market. However, as economic conditions improve, this concern should decrease.

Strategies to Encourage Greater Availability of Energy Efficiency Financing

GENERAL STRATEGIES

■ **The most effective way to encourage market transformation is to help the market drive the change itself.**

Respondents from banks and insurance companies agree that the strong business case for energy efficiency can help the market to drive itself. The market can only put a premium on efficiency if it is fully transparent about energy use in buildings.

Greater reporting of building energy use is the top priority for a few respondents. This includes voluntary measures like the newly adopted ASTM Energy Disclosure Standard and enacting government mandates for reporting, such as the legislation in place in Washington, D.C., and New York City. Both would have the effect of making energy disclosure standard practice.

- One respondent also saw a need to educate small business owners on the advantages of efficiency upgrades and the various initiatives designed to encourage the market.

■ **Place a greater emphasis on overall green projects rather than just efficiency in commercial real estate projects.**

Two respondents directly referenced the preference for green renovations over simple energy efficiency when considering financing. Green buildings have been associated with health and productivity benefits, in addition to operational savings, and these qualities have been demonstrated to be valued by tenant companies and occupants.

- Since a building's occupancy rates and rents are significantly more important than operating costs in loan evaluations, deciding to pursue green projects, rather than narrowly focusing on energy efficiency improvements, can help firms obtain financing more easily, especially as more data continue to emerge on how green buildings compare to the rest of the leasing market.

■ **More data on energy efficiency projects need to be made publicly available.**

For banks to allow the savings expected from energy efficiency loans to impact the loan terms, they need historical data that demonstrate savings and show risks of typical renovation projects. These data will clarify the risks to banks in offering energy efficiency loans and thus assist with more effective underwriting of those loans.

STRATEGIES FOR BANKS

■ **Banks need to alter the lending practices around real estate that has a mortgage.**

Until the problem of adding additional debt to a mortgaged property is resolved, banks will not be able to broaden the market for energy efficiency improvement loans for buildings.

■ **Standardized or simplified loan processes for energy efficiency projects would benefit both banks and owners.**

Two respondents felt that a simplified, standardized process for energy efficiency loans would

Profile Of Firms

BANKS
(6 firms–7 respondents)
- 4 Global and 2 Regional Institutions
- Headquarters: NY, CA, PA, BC (Canada)
- Total Assets: Range from $14.4 billion to over $1 trillion, with more than 50% of respondents at institutions with assets over $1 trillion

REAL ESTATE INVESTMENT FIRMS
(3 firms–3 respondents)
- Specialize in Green/ Sustainable real estate investments
- Advisory firm, Advisory and Private Equity Firm, Global Consultant
- Small firms (10 people or less)

CONTINUED

make these loans more profitable for the banks and therefore easier for building owners to secure. However, part of that process involves increasing internal intelligence within the bank about how to account for energy efficiency returns.

■ **Banks can better quantify risks associated with energy efficiency if they actively seek knowledge about it.**

Government and construction industry associations can play a role to help banks become more informed. Many of the respondents pointed out that a critical stumbling block is the inability of banks to account for the savings generated by energy efficiency. However, a few did suggest that banks can address this issue directly.

- One respondent discussed how external expertise can bridge the gap for the banks if the energy efficiency retrofits are being done using the services of an energy service company (ESCO). The ESCO's energy cost savings estimates, which provide the basis for its profit, supply banks with a trustworthy estimate to use for their own underwriting purposes. (For more information on what ESCOs are and how they can encourage wider adoption of energy efficiency, as well as the challenges to using them, see page 22.)
- One respondent describes how his institution increased its internal expertise on the benefits of common, "cookie-cutter" retrofit activities in order to be able to take those benefits into account when they process loans.
- Another explains that increasing the bank's internal expertise on these matters can even put the bank in the position to make recommendations to the building owner to increase the loan without increasing the risk of repayment, thus allowing the bank to generate more business from its clients.

STRATEGIES FOR GOVERNMENT

■ **If government provided loan guarantees or other forms of credit enhancement for building owners, banks would find it much easier to finance energy efficiency projects.**

The owner's credit plays a central role in determining whether a bank will issue it a building improvement loan, and a large number of small businesses do not have strong, established credit.

A few respondents suggest that government backing the loans directly or in some other way providing a guarantee of repayment for a percentage of the loan could significantly increase this market.

- One respondent offered the Small Business Administration's practice of providing loan guarantees as a successful example of this kind of government support, and several argued that government programs that minimized the bank's exposure to loan default could dramatically encourage this market.

■ **Current government incentives, especially those that can be collateralized, should be continued.**

These programs are regarded by banks as one way to help government secure these loans. As long as the incentives are implemented in a way that clearly lowers the risk of loan default, they are considered valuable by the respondents.

■ **Government regulations regarding the addition of debt to existing mortgages may need to be reconsidered, in light of the way that commercial real estate mortgages are currently securitized.**

Regulations put in place after the S&L crisis make this particular scenario challenging. If energy efficiency is to be considered an important priority, regulations that allow reasonable, well-secured debt on mortgaged properties to gain approval more directly may need to be enacted.

case study

Creating a Culture of Energy Efficiency in Commercial Office Buildings

Hines

ACHIEVING OPERATIONAL SAVINGS

As a developer and builder of commercial properties, Hines has always prioritized energy efficiency. Robin Obaugh, vice president of engineering for Hines in Houston, TX, states that newly hired building engineers are immediately taught "that our mission is to satisfy our tenants, and the number two mission is to accomplish the first mission with the least amount of energy use possible."

As their business has grown to include acquisitions, Hines has faced the challenge of making the onsite staff they inherit part of that culture. They have found that educating the new team properly and providing the tools that demonstrate how the building uses energy can significantly improve the building's energy use, even before any investments in building upgrades are made.

Leadership from the Top

Obaugh explains that it is Gerald Hines' commitment to issues surrounding building performance that led to their corporate emphasis on sustainability. He states, "Since we have that leadership from the top, it is very easy for that priority [around energy efficiency] to flow down."

Training Forms the Basis

A mission statement alone, however, is not enough to create a team that has integrated energy efficiency into their management of a building. Pat Griffin, vice president of engineering for Hines in Chicago, IL, states that "investing in education and support of the onsite team pays huge dividends." He goes on to affirm that "a highly educated team can reduce far more energy from operating existing systems than any renovation or retrofit could possibly achieve."

The Hines management team at 131 South Dearborn were able to achieve 23% energy savings without any significant technology upgrades.

Make Staff Accountable for Energy Performance Goals

Most building managers want their buildings to operate well, but even for a well-trained team, the challenge is encouraging them to allocate the time to improving energy performance.

In order to keep efficient energy use as a priority for their building management staff, Hines has developed a proprietary utility management program that tracks energy consumption in their properties on a monthly basis year-over-year. All variations, both increases and decreases, from the previous year's performance must be explained.

The attention to monthly variations not only helps to improve energy performance but also to prevent decisions that save energy at the expense of tenant comfort or sound building operation. Obaugh regards the fact that their engineering managers are held accountable for monthly performance of their buildings as essential to ensure that these measures are allocated sufficient time and attention.

Use Teams to Identify Opportunities and Achieve Results

Many of the successful projects undertaken by Hines to improve building energy performance are initiated by the onsite teams at the buildings. Kevin Krejci, assistant engineering manager, reports that an energy task force team drawn from the building managers has been created to encourage their staff to explore innovative ideas about how to save energy. Leonard Swonke, engineering manager, reports a similar type of brainstorming at an annual meeting of the building teams who report to him.

Obaugh affirms that all ideas, even those that may seem too expensive to implement, are fully considered. "We really try to run the traps: What is this product or program? What will it do for the property? What is the real cost?" Having a well-trained, energy-conscious team that is intimately familiar with

CONTINUED

Hines

ACHIEVING OPERATIONAL SAVINGS

building operations encourages creativity and insight when it comes to potential savings.

Challenges and Opportunities Presented by Building Acquisitions

The true test of the Hines culture comes not from the buildings they have built and managed but from their new acquisitions. Working with the existing management staff clarifies how simply raising awareness and commissioning the existing systems can significantly impact building performance.

KNOW WHERE YOU RANK, AND INCREASE STAFF AWARENESS OF BUILDING PERFORMANCE

Griffin reports that providing the building management team with an assessment of how their building performs compared to other Hines properties is often the first step to improving building performance. "The first thing they say to me is, 'Nobody has ever told us that our energy consumption was high.'"

That awareness, combined with training and guidance on how to improve, sets the stage for higher performance, both immediately and in the long term. Once the team starts to see monthly improvements in the building performance, they become engaged. Griffin states, "We find that providing training and guidance, then sharing the positive results of the team's actions, results in energy management getting into their blood. Once this happens, there is no end to what the team will strive to accomplish."

EFFICIENCY FIRST: USE RETROCOMMISSIONING TO IDENTIFY OPPORTUNITIES

Before the Hines staff will even consider making technology upgrades, they focus on improving existing building performance. "Before we introduce any new technology," says Obaugh, "we dive into exactly how the building is built, the design of its mechanical systems, and then our first effort is to make sure the building is operating as per design and to see how we could tweak that performance."

Griffin points out that commissioning the building can lead to discoveries that yield large energy savings. For example, a commissioning process could reveal that equipment that is scheduled to turn off may still be running. Without a thorough process and good building automation system, problems like that can go undetected.

LOOK FOR TECHNOLOGY IMPROVEMENTS AND OPPORTUNITIES

Only after the building staff is aware of how their building performs and have retrocommissioned all its systems will they then consider what kind of technology will improve building performance. By this point, the staff's immersion into the workings of the building systems provides great insight into those that would benefit most from an upgrade, allowing Hines to maximize its investment in the property.

Each property benefits from different technologies, but a few technologies often provide significant energy performance improvement with impressively low payback periods:

"Providing the training and guidance, and then sharing the positive results of the team's actions, results in energy management getting into their blood."

stats

131 South Dearborn

Location
Chicago, IL

Building Size (Square Feet)
Gross : 1,778,502

Rentable: 1,504,264

Owner
131 S. Dearborn LLC

Building Management Company
Hines

Cost of Improvements
Operational improvements only, no retrofit costs

Savings (kWh) in the First 12 Months of Hines Pperation of Building
6,232,496

Percentage of kWh Savings
23%

Value of Energy Savings in the First 12 Monthes of Hines Operation of Building
$525,733

Percentage of Energy Cost Savings
21%

CONTINUED

Hines

ACHIEVING OPERATIONAL SAVINGS

- Improved building automation systems that measure as much as possible
- Variable speed drives
- Lighting retrofits—including LEDs

Specific Property Examples

131 SOUTH DEARBORN, CHICAGO, IL

Hines took over the management of this seven-year-old building in the fall of 2009, and for the following year, focused their attention on educating the existing onsite team that they inherited, in addition to fully retro-commissioning the building systems. No significant investments in new equipment or technology were made for that period. The table indicates the results they were able to achieve, just by optimizing the current building systems. They reduced their kWh use by 23.5%. Even on a modern building with good systems, close attention to building operations can yield extraordinary benefits. And it is noteworthy that all of these were achieved without any compromises to tenant comfort.

Now that building operations have been tightened, they are considering investment in technology. Griffin reports that they are putting in motion sensors where practical and flush valves in the restrooms. They have added variable frequency drives to the lobby fans and are considering adding drives to other equipment as well. With these upgrades, they expect reductions in energy use to continue.

1 GREENSPOINT, HOUSTON, TX

Krejci describes how the first step they took at this property was learning more about and expanding the operation of their building automation system. After educating both themselves and the building operations staff, they then reprogrammed existing systems and added programs for new systems including chilled water, condenser water and supply air. By educating the staff about the system, they helped institute ongoing changes.

Krejci describes how the operators can see in real time how the adjustments they make to temperature or airflow "impact the overall consumption for the central plant ... and that has tremendously increased the operator awareness of energy."

They have seen significant energy cost savings, but the most surprising benefit is that by improving the air supply to the building, they also improved tenant satisfaction. Before the air system operation improvement, they received 20 to 30 calls a month about tenant comfort, but since it has been completed, they typically only receive about one or two. Krejci points out that not only are the tenants happier, but the reduced call volume "frees up the engineers who had to run those temperature complaints to do other things."

717 TEXAS, HOUSTON, TX

An energy review meeting by the operating staff resulted in retrofit and operations projects that produced savings of over 1 million kWh over a 12-month period. Their retrofits included installation of variable frequency drives and lighting retrofits, including the use of LED lighting in the building lobby. Operationally, they performed an outside air reset, discharge air reset and chilled water supply reset. The culture of efficiency led to the staff engagement, which in turn led to the projects that would yield the best results.

Not all of the projects they wanted to do had short payback periods, but they knew that everything would ultimately improve building performance. One strategy they used was to combine all the projects together, which allowed the overall payback to be sufficiently strong to convince the building owner to invest in the project as a whole.

An unexpected factor that improved their energy performance is that the outside air optimization and reset program allowed them to shut the central plant down for the large majority of cold days (temperatures in the high 30s) because they could cool the chilled water loop by using the cold outside air. ■

case study

Conserving Energy at a Major Healthcare Facility and Reaping Financial Rewards

Gundersen Lutheran

STRATEGIES AND ACTIVITIES FOR ENERGY SAVINGS ACROSS THE HOSPITAL

As a sector, hospitals and healthcare facilities account for a proportionally larger amount of energy use and emissions. According to the U.S. Department of Energy, hospitals use about 2.5 times as much energy as a similar-sized commercial building, because they are open 24 hours a day and have extra commitments on air filtration and circulation, air cooling and waste management. U.S. hospitals are spending more than $5 billion on energy costs annually, so finding solutions to rising energy costs has become critically important.

Gundersen Lutheran is a physician-led, not-for-profit, integrated healthcare system headquartered in La Crosse, Wisconsin. It comprises of 41 clinic locations and a 325-bed Tertiary Medical Center, which is a Level II trauma and emergency center as well as the designated Western Clinical Campus for the University of Wisconsin School of Medicine & Public Health and School of Nursing.

This integrated healthcare system serves patients in 19 counties across western Wisconsin, northeastern Iowa and southeastern Minnesota and is nationally recognized as being in the top fifth percentile of hospitals for the past 11 years.

Leadership Sees Energy Reduction as a Key Priority

In 2007, Gundersen Lutheran witnessed its energy costs increasing at a rate of $350,000 each year. That made energy reduction a top priority. Under the guidance and vision of its CEO, Jeff Thompson, Gundersen Lutheran established its environmental program, called Envision.

The Envision program aims to improve air quality and the health of its community as well as reduce the cost of healthcare to its patients by hedging against rising energy costs. Its goal is to offset 100% of the fossil fuel energy it consumes by 2014 through energy conservation and by creating clean, renewable energy. The program can serve as a model for healthcare providers nationwide.

The key elements of the Envision program are:

- **Energy management, including both energy efficiency and renewable energy**
- **Recycling**
- **Waste management and control**
- **Sustainable design of new facilities**

The Envision program is led by Jeff Rich, the executive director of major projects and efficiency improvement, who was hired right before Gundersen Lutheran conducted its energy audit in February 2008. The audit helped Rich and his team identify many energy conservation opportunities, including low-cost ways to reduce energy use, such as by optimizing the use of existing equipment.

Energy and Cost Savings Achieved in Stages

STAGE 1: RETROCOMMISSIONING

The health system started the retrocommissioning process in May 2008 and began seeing paybacks quickly. Jeff's background in mechanical engineering and his colleague Corey Zarecki's background in chemical engineering helped them tackle energy conservation measures that

stats

	Cost	Annual Savings	Payback (years)
Chiller/Tower Optimization	$88,000	$65,000	1.4
Zone Scheduling (exhaust fans and air handlers)	$77,000	$91,000	0.8
Condenser Water Acid Feed	$17,000	$26,000	0.7
Reducing Station for HP Boilers, Boiler Economizers, New Boiler Controls, VFD Drives, Auto Blowdown	$285,000	$69,000	4.1
Steam Traps	$230,000	$42,000	5.5
Energy-Efficient Lighting System	$1,615,000	$265,000	6.1
Nightwatchment Software Program—Auto Turn-Off of Computers	$130,000	$39,000	3.3
Removable Insulation on Fittings, Valves, Unions, Etc.	$237,000	$87,000	2.7
New Chiller	$250,000	$70,000	3.6

CONTINUED

Gundersen Lutheran

STRATEGIES AND ACTIVITIES FOR ENERGY SAVINGS ACROSS THE HOSPITAL

As part of Gundersen Lutheran's retrocommissioning process, changes were made to the chiller's system programs to optimize cooling tower fan utilization with the chiller compressor.

they considered the low-hanging fruit.

STAGE 2: PRIORITIZING EFFORTS TO ACHIEVE RESULTS

Using a Six Sigma approach, they prioritized projects based on payback time and impact. As a result, they achieved significant success. In the first eight months of the program, they reduced energy consumption by 10%. By the end of the next year, they were able to get it down to 25%.

According to Rich, "Most of these initial projects had a less than two-year payback period and were considered a better investment than some other things that we could have been doing with our capital." As a result, these activities comprise approximately 40% of their projects.

Key Activity Examples

- **Switching from using three low-pressure boilers to create steam to heat buildings to using two high-pressure boilers, which were already running to sterilize equipment**. The adjustment is saving the health system $69,000 per year.

- **Adding acid feed to improve efficiency.** Chillers used to cool campus buildings were hampered by buildup of calcium carbonate in their copper tubing. The calcium carbonate, which comes from the hard water supply, impedes heat transfer, increasing the amount of work the chiller motors must do. The addition of an acid feed has saved the health system more than $25,000 annually.

- **Adding controls to the exhaust fans used to ventilate laboratories and pharmacies**. By adding these controls, Gundersen was able to schedule their exhaust fan use so that equipment does not have to run unless it is needed. This improvement led to savings of more than $90,000 per year.

- **Addressing computers.** Gundersen Lutheran Health System has more than 8,500 computers within its organization. Many of those computers were left on 24 hours a day, seven days a week, leading to a large draw on energy and higher energy costs. Gundersen Lutheran's information systems department teamed up with the efficiency improvement team to come up with a solution that will save the organization approximately $40,000 in energy costs when fully implemented. The project involves the installation of Nightwatchman software on all of the health system's computers. The software allows unused computers that have been left on to be automatically turned off at a set time each night.

STAGE 3: IDENTIFYING LARGER OPPORTUNITIES AND INVESTMENTS

The retrocommissioning process also revealed projects Gundersen Lutheran could undertake that would require more significant investment but would provide a greater savings over time.

One example was a comprehensive lighting retrofit of the hospital and all the clinics, in which the healthcare system switched to high-efficiency fluorescent lamps (from

CONTINUED

Gundersen Lutheran

case study CONTINUED

Gundersen Lutheran

STRATEGIES AND ACTIVITIES FOR ENERGY SAVINGS ACROSS THE HOSPITAL

T-12 tubes to T-8) and ballasts. The new equipment will save Gundersen Lutheran $250,000 per year in reduced energy costs. Because the lighting retrofit will cost more than $1 million, it will take nearly six years for the health system to recover its initial investment.

These types of projects are what Rich refers to as competitive capital projects, which typically have a three-to-five-year payback period and make up 40% of their projects. "These projects had to go head-to-head up against some of the other needs of the organization, and many times we were able to qualify for Wisconsin Focus on Energy grants" says Rich.

Beyond Efficiency: Using Renewable Energy to Help Achieve Carbon Neutrality

Gundersen Lutheran has a goal of offsetting 100% of the fossil fuel it consumes by 2014. To achieve this goal, it plans to develop partnerships with municipalities, utility companies and businesses to utilize available renewable-power opportunities.

Currently Gundersen Lutheran is engaged in a combined heat and power (CHP) project that uses waste biogas discharged from the La Crosse City Brewery and turns it into electricity.

The project, which was powered up in 2009, is generating three million kWh per year, approximately 8% of the electricity used on Gundersen Lutheran's La Crosse and Onalaska campuses.

Gundersen Lutheran's other renewable projects include solar photovoltaic panels on a LEED certified underground parking garage generating 50,000 kWh–75,000 kWh annually, two wind energy projects that will generate 15,000,000 and 13,000,000 kWh, and a landfill gas project that will offset 100% of Gundersen Lutheran's Onalaska campus energy needs.

A Self-Financed Approach

The majority of Gundersen Lutheran's energy plan has been self-financed. It has invested roughly $5 million in efforts to upgrade its existing equipment or make it more efficient and to build the system's renewable energy projects. Its strategy is to use savings from no- and low-cost energy reduction efforts to invest in energy renewal programs, that have a longer payback period.

Gundersen has received support from the state of Wisconsin's Focus on Energy program, which was set up to assist energy efficiency efforts for businesses and residents. That program typically covers 10% of projects costs.

Measurement Is Helping the Program Achieve Its Goals

In order to measure and track their energy consumption and savings, Rich and his team went back and collected all historical data from their utility bills, from all of their facilities. It was a challenging process, but they were able to establish a baseline. Using that baseline, Rich's team identified areas of opportunity and targets, and since that time, they have measured their results on a monthly basis.

They have achieved a 25% energy efficiency improvement—equivalent to $1.25 million annually in savings. When they started in 2007, they had a $5 million energy bill across their system and it was increasing at a rate of about $350,000 a year, even at the status quo level. Even though this is 1% of their operating budget, it is still $5 million dollars and they are only a 3% or 4% margin business.

Being Flexible Is a Key Part of Success

Gundersen Lutheran has moved quickly to establish an energy efficiency program. Less than a year after conducting its initial energy audit, the health system committed to spending $5 million on equipment to make its operations more efficient and to invest in renewable energy. The health system's plans have changed frequently as the energy efficiency team has discovered new technologies with faster paybacks. Because energy technology is rapidly evolving, such programs require flexibility. They may also require a willingness to pursue partnerships to produce renewable energy.

To other healthcare institutions seeking to reduce their energy use, Rich recommends just getting started. Rich claims, "We're not perfect, and we have a lot of things we've done, but we have a lot of things that we can improve on. But I would say, get started." As he did with Gundersen Lutheran, Rich suggests first starting with the gathering of utility bills, and then understanding where your company is positioned. The next steps are to find a benchmark to establish where your company should be, for the size of its building, and getting an energy intensity benchmark. Rich recommends the EPA Energy Star website which has all this information. ■

Comparative Market Value

of LEED Certified & Energy Star Labeled Office Buildings

Building owners are investing in green and energy efficiency upgrades with the primary goal of improving energy performance and reducing operational costs, but they are also motivated by business opportunities as well as human factor benefits that are important to occupants.

In 2009 and 2010, McGraw-Hill Construction, CB Richard Ellis (CBRE) and the University of San Diego (USD) investigated commercial buildings managed by CBRE that underwent green and energy efficiency upgrades and achieved the Energy Star label and/or certification under the LEED for Existing Building: Operation and Maintenance (EBO&M) program.

This group of buildings performed significantly better than the market with regard to occupancy rate, critically important during this downturn, which has been plagued with high vacancy rates. The LEED EBO&M certified buildings had occupancy rates 4.74% higher than the market, while the Energy Star Labeled buildings had occupancy rates 2.15% higher than their markets.

The LEED EBO&M certified buildings also performed better than the market with regard to rental rates, with a higher average rent of 7.38%.

A recent 2010 study by Eichholtz, Kok and Quigley confirms these findings. Their results demonstrate that green certification commands rental rates that are approximately 3% higher per square foot than identical buildings without certification, and the sales prices of green buildings are higher by approximately 16%. Also, the study reports, the value of a green building is about $5.5 million more than the value of a comparable unrated building.[19]

For the methodology behind the data in this section, see page 72.

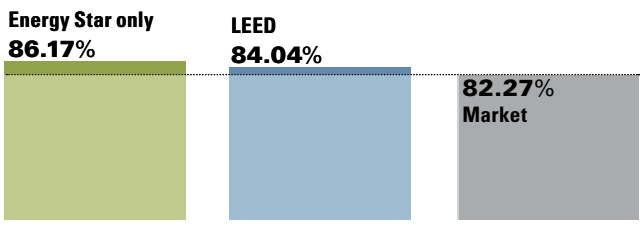
Key Trends

Key trends emerging from these studies on the benefits of green and energy efficiency upgrades to commercial buildings include the following:

- **Owners and corporate leaders are driven by factors that are part of a profit mission:**
  - Increasing return on investment
  - Increasing employee engagement, retention and recruitment
  - Improving health and well-being
- **Operational cost savings are a key driver of green and energy-efficient upgrades in both new and existing buildings.**
- **Energy efficiency is becoming common practice—part of doing good business.**
- **LEED is increasingly recognized in the market.**
- **Measurement is a challenge, but corporate leaders recognize its critical importance.**

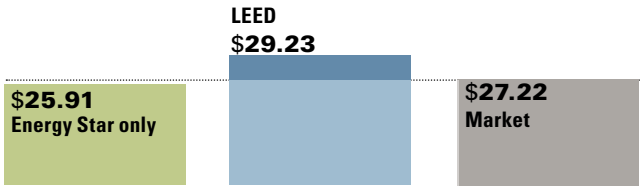
LEED and Energy Star Buildings Have Higher Average Occupancy

Source: CB Richard Ellis, 2010



LEED Buildings Have Higher Average Rental Rates

Source: CB Richard Ellis, 2010



19 Eichholtz, Kok and Quigley. Doing Well By Doing Good? Green Office Buildings. American Economic Review 100 (December 2010): 2492-2509.

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Financial Benefits Expected from Green Upgrades

Expected financial benefits are one of the key reasons for the dramatic growth of green buildings over the last five years. Owners are interested in financially lucrative properties and expect paybacks from their green investments in the form of decreased operating costs, increased building values, improved ROI, increased occupancy and higher rental rates.

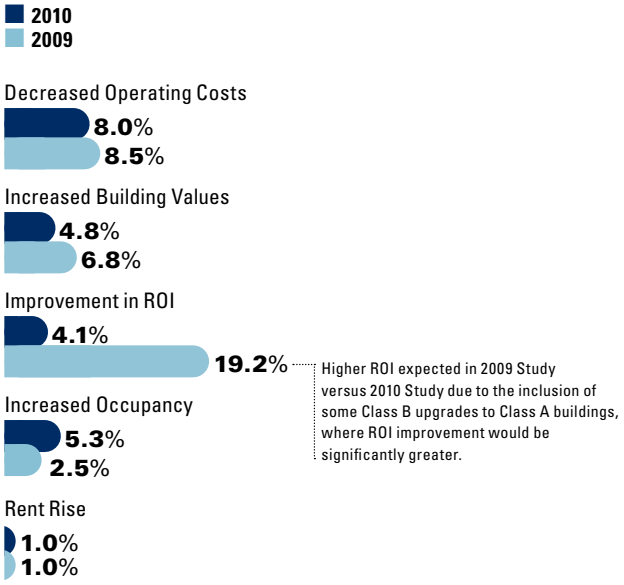
These findings are indicative of the trend that green buildings are increasingly being preferred by consumers. The reason for this preference can be explained by several advantages green buildings have over conventional buildings, including:

- **VALUE OF GREEN BUILDING: In Gregory Kats' 2010 *Greening Our Built World*, he reports that green buildings cost on average $3–$9 per square foot more than conventional buildings, but provide a net present value of $24 per square foot when energy and water savings and other benefits are considered, such as productivity, health and well-being.[20]**
- **ENERGY SAVINGS: Green building can be 25%–30% more energy efficient than conventional buildings. Kats reports the 20-year present value of energy benefits from a typical green building is $5.79 per square foot, and the paybacks exceed the additional cost of green by a factor of four to six.[21]**
- **WATER SAVINGS: Through strategies such as efficient water and plumbing fixtures and water reuse, green buildings can reduce water use by 39% and offer higher water savings than conventional buildings.[22]**
- **HEALTH, WELL-BEING AND PRODUCTIVITY: Green buildings offer improved indoor air quality and increased daylighting versus conventional buildings. More benchmarking and measurement are needed, but based on a 2009 CBRE/USD study, benefits of $153.61 per square foot and an estimated net present value of $100 per square foot in productivity and health benefits are estimated.[23]**
- **REPUTATION: As evidence mounts that employees prefer working for corporations with a commitment to corporate responsibility and sustainability, green buildings can serve as a market differentiator and provide firms with the ability to attract and retain quality talent.**

Business Benefits Expected Across the Industry by Building Owners

Sources: *Green Building Retrofit and Renovation SmartMarket Report*, McGraw-Hill Construction, 2009; *The Business Benefits of Green Building SmartMarket Report*, McGraw-Hill Construction/CB Richard Ellis, 2010.

Note: Surveys include similar populations of commercial office building owners.



20 Kats, Gregory. Greening Our Built World: Costs, Benefits and Strategies. Island Press. Washington DC. 2010. Page 9. ; 21 Ibid. Page 9.; 22 Ibid, Page 28.; 23 Norm G Miller & Dave Pogue. Journal of Sustainable Real Estate. "Green Buildings and Productivity". Vol. 1. No 1. Fall 2009.

Owner Perspectives

The majority of owners express confidence that green upgrades are a cost-effective way to improve the performance of existing buildings.

Close to 80% of building owners agree that a high up-front investment is not necessary to green an existing building—36% strongly agree.

This bodes well for the receptiveness of owners to investments in green and energy efficiency—as long as they are supplied with intelligence that aligns with their business decision process.

Key Findings from Owner Data

- **Owners consistently report increases in ROI, occupancy and rent premiums from green buildings. This intelligence can be important when trying to influence the market.**
- **Owners are motivated by profit measures, not just operational cost savings. Therefore, arguments that reflect those needs will help draw owner attention.**
- **Tools that help owners measure and benchmark business and human benefits would be extremely valuable and marketable. Owners can use this information to make better investment decisions.**
- **An owner who invests in green building is committed to doing so in the future, suggesting that the most significant hurdle is getting an owner started.**
- **Building owners see government incentives as less important than market incentives. Therefore, financial benefits become extremely important.**

Benefits: Financial and Human Factor

Owners expect a number of key benefits from investments in green and energy efficiency renovations and retrofits to the buildings already in their portfolios.

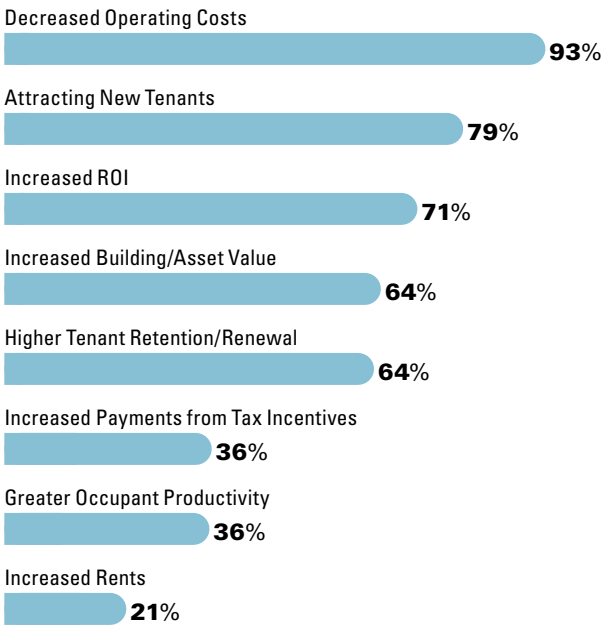
- **FINANCIAL BENEFITS: The research findings illustrate the motivations of cost savings and financial benefits behind green upgrade investments—93% of owners expect to decrease operational costs, and 71% expect to see increased return on investment.**
- **BUSINESS OPPORTUNITIES: The research also demonstrates that owners are seeking to differentiate their properties and be more competitive in the marketplace—79% of owners expect to attract new tenants, and 64% expect higher tenant/customer retention and renewal.**

They key research in the data sections on pages 16–39 confirm these findings, illustrating a commitment of C-suite executives to sustainability and green building practices across all industries.

Expected Benefits from Green Features

(According to Building Owners)

Source: *The Business Benefits of Green Building SmartMarket Report*, McGraw-Hill Construction/ CB Richard Ellis, 2010



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Sidebar Data: Business Benefits of Green and Energy-Efficient Retrofit and Renovation Activities

Owner Perspectives CONTINUED

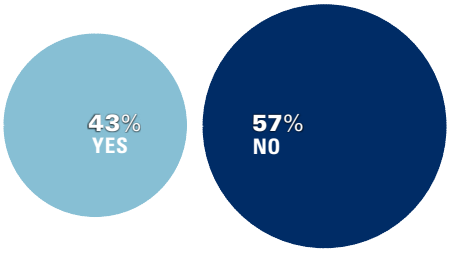
■ **SOFT BENEFITS: Human factor business benefits, such as lower healthcare costs and absenteeism and higher productivity, are being tracked by a large portion of commercial building owners as they relate to impacts of their building upgrades. In fact, the rates are significantly higher than for executives across the industry (see page 36).**

There is some variation in the types of benefits being measured. Commercial property owners are more often tracking customer-related factors such as retention and turnover (43%) and customer loyalty (36%), with negligible numbers tracking other soft benefits, such as healthcare claims, absenteeism or worker productivity.

These soft benefits may be extremely hard for commercial building owners to measure, since they often have multiple firms leasing space in their buildings. However, this information would be invaluable in attracting and retaining tenants and at justifying higher rental rates. Therefore, it may become critical over time for owners to work with tenants to measure these factors.

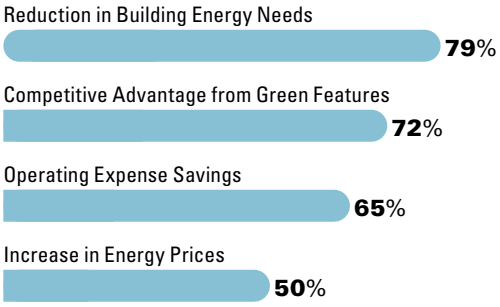
Commercial Building Owners Engaged in Measuring Soft Benefits of Upgrades to Buildings

Source: *The Business Benefits of Green Building SmartMarket Report*, McGraw-Hill Construction/ CB Richard Ellis, 2010.



Major Triggers to Green Renovation Work
(According to Building Owners)

Source: *The Business Benefits of Green Building SmartMarket Report*, McGraw-Hill Construction/ CB Richard Ellis, 2010.



Triggers and Obstacles

■ **TRIGGERS: The survey results show that the primary drivers causing owners to invest in green features are reduced energy (79%) and competitive advantage (72%).**

■ **OBSTACLES: 43% of building owners cite that high initial investment is a challenge to investing in green building retrofits. However, more than half of all owners do not see any obstacles to investing in green.**

This finding is very different from the challenges corporate owners (see page 31) have in implementing sustainability, which may suggest that it is easier to make the business case for specific building upgrades.

Building Manager Perspectives

Building managers have a critical role to play in the activities that are encouraged and adopted in commercial office buildings. As the interface between owner and the occupants, building managers are faced with the challenges of operating and maintaining energy-efficient and green features of the building, as well as communicating those benefits. They can be an important player in convincing owners to invest in green.

Key Findings from Building Manager Data

- **Building managers are most concerned with cost savings. Therefore, an emphasis on energy, water and operational cost savings will be particularly compelling to them.**
- **Building managers are focused on selecting and installing green building products and services.**
- **Over three quarters of building managers have installed energy-efficient features into LEED certified buildings. Therefore, knowledge of LEED can be an advantage in understanding the technology demands and needs that building managers—especially those already more receptive to green or energy-efficient upgrades—may have.**

Benefits: Increased Satisfaction

For building managers, ensuring satisfaction of building occupants is a critical part of their role. Therefore, features that impact this satisfaction are particularly important. Nearly all (97%) report tenants being more satisfied after green upgrades.

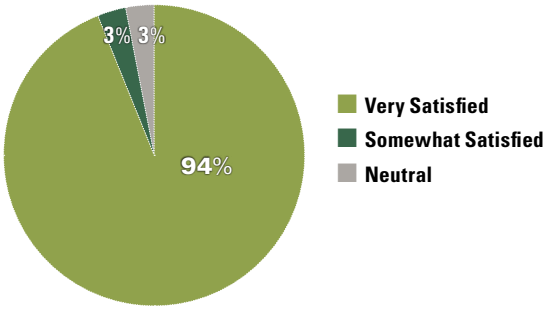
- **FACTORS AFFECTING SATISFACTION: According to building managers, many features impact tenant satisfaction, but most involve things noticeable to people occupying those buildings. Features that are reported as having the top impacts include: high-efficiency plumbing fixtures (85%), green cleaning products (84%) and energy-efficient lighting (82%).**
- **PRODUCTS: Building managers are focused on selecting and installing green building products and services that improve water and energy efficiency and indoor environmental quality. Most noticeable upgrades to tenants and occupants are:**
  - Individual temperature controls (76%)
  - Low-E window films (41%)
  - Low-flow toilets (91%)
  - Motion-sensitive faucets (67%)

Green technologies must be operated and maintained properly for benefits to be realized. In order to better operate new technologies, building managers need to be informed about the green equipment installed in their buildings.

Experts advocate that building managers need to be included in the design process in order to familiarize themselves with the green equipment.

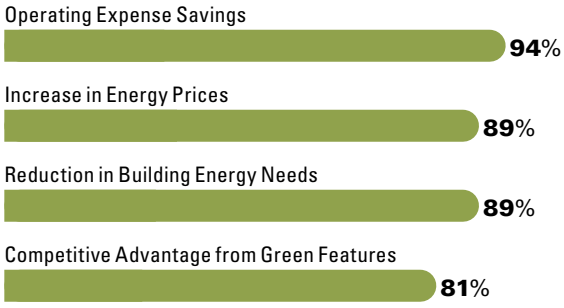
Satisfaction of Tenants after Green Building Upgrades (According to Building Managers)

Source: *The Business Benefits of Green Building SmartMarket Report*, McGraw-Hill Construction/ CB Richard Ellis, 2010.



Major Triggers to Green Renovation Work (According to Building Managers)

Source: *The Business Benefits of Green Building SmartMarket Report*, McGraw-Hill Construction/ CB Richard Ellis, 2010.



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Sidebar Data: Business Benefits of Green and Energy-Efficient Retrofit and Renovation Activities

Building Manager Perspectives CONTINUED

Triggers and Obstacles

■ **TRIGGERS**
Commercial building managers are primarily motivated by factors based on energy, water and operational cost savings.

■ **OBSTACLES**
Building managers also report several obstacles to green retrofit and renovation of existing buildings, such as higher first costs, but at relatively low levels.

Influence Agents

In their green decisions, building managers are influenced by several different agents.

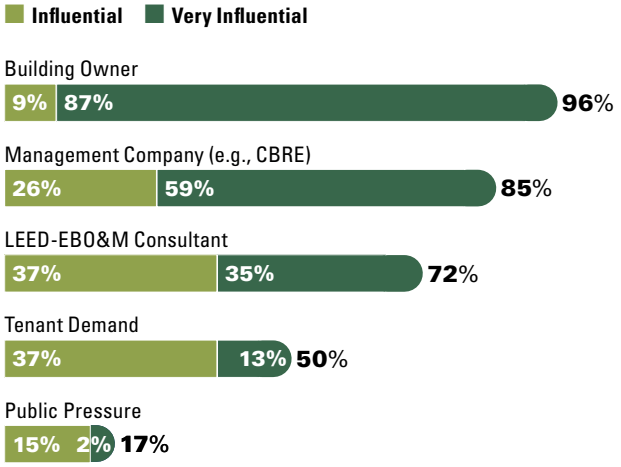
■ **OWNERS: 96% of building managers are influenced by building owners, and 87% find them very influential. This is not surprising since commercial building owners ultimately pay for green upgrades.**

■ **MANAGEMENT COMPANIES: Property management companies (85%) have strong influences upon building managers. As a result, commitments that these firms make will influence the retrofit market.**

■ **LEED EBO&M CONSULTANTS: 72% of building managers are influenced by LEED consultants decisions about what activities to engage in. For technology and service leaders, they may pose a unique point of entry to encourage increased energy efficiency investment.**

Influence Agents for Green Retrofits
(According to Building Managers)

Source: *The Business Benefits of Green Building SmartMarket Report*, McGraw-Hill Construction/ CB Richard Ellis, 2010.



■ **TENANTS: Half of building managers are influenced by tenants, though only 13% find them very influential. The weak influence of tenants may be due to the fact that many of them receive fewer direct financial benefits of green upgrades. Green lease provisions and submetering can change this and give tenant firms the incentive and ability to be more influential concerning green upgrades.**

Tenant Perspectives

In today's down economy, tenant firms in commercial office buildings have more selection of space to lease, and therefore can have greater influence on features of that office space. For owners looking to attract new tenants, and at higher than market value, having buildings that differentiate them in the market is critical.

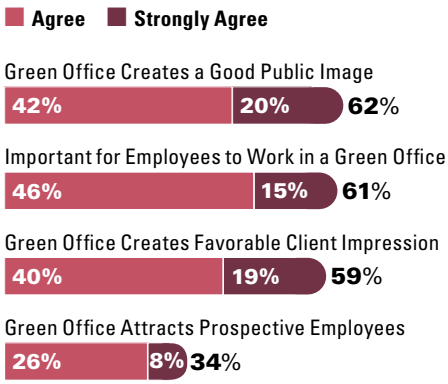
Below are some key influence factors for tenants, and the advantages they see with regard to green building upgrades.

Key Findings from Tenant Firm Data

- **Tenants find that a green office creates a good public image and a favorable client impression. Owners can attract more tenants by marketing these benefits of green buildings.**
- **Tenant firms report better employee health and increased productivity as a result of green features. Employers can save on healthcare costs by investing in green.**
- **Green features are influencing tenant leasing decisions. Owners can capitalize on this trend by investing in these green features.**

Importance of Green Office for Tenants

Source: *The Business Benefits of Green Building SmartMarket Report*, McGraw-Hill Construction/ CB Richard Ellis, 2010.



Benefits: Importance of Green Buildings

- **COMPANY PUBLIC IMAGE:** **Factors around company image—both internally and externally—were of the highest levels of importance to tenant firms. Therefore, in influencing tenant companies, emphasis on these factors will be of utmost importance.**
- **ATTRACTING EMPLOYEES:** **There are a relatively small number of tenant firms that place importance on using green to attract new employees as compared to the other factors. The current economic downturn may explain why this measure was selected by fewer firms than the other three. Employees may be less inclined to insist on working in a green office in a difficult job market.**

CONTINUED

Sidebar Data: Business Benefits of Green and Energy-Efficient Retrofit and Renovation Activities

Tenants Perspectives CONTINUED

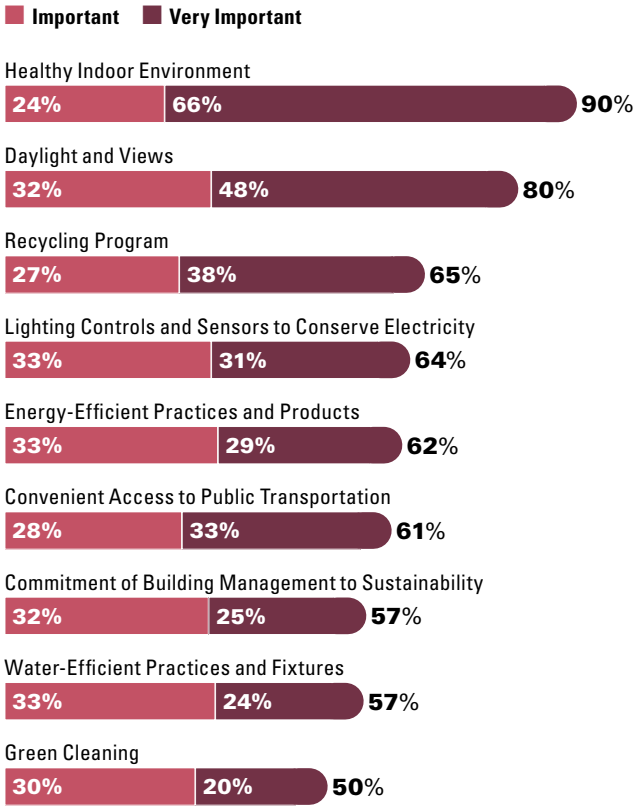
Benefits: Business Impacts from Green and Energy-Efficient Upgrades

As mentioned previously, green buildings can provide soft benefits—such as improved employee productivity and satisfaction—that can have significant financial rewards for employers who are incurring significant healthcare costs for their employees.

- **PRODUCTIVITY IMPROVEMENT LEVELS:** **10% of tenant firms report an increase in the productivity of their employees as a result of working in a building with green features, while 34% state that they do not know if there was an increase, again pointing to a measurement challenge for these "soft" benefits.**
- **HIGHER PRODUCTIVITY FACTORS:** **Tenants that report an increase in productivity are impacted by factors around comfort (better airflow, daylighting, temperature). These factors all make people happier in the workplace, and therefore, make their employers (the tenant firms) have a more satisfied and productive workforce.**
- **LEASING DECISIONS:** **Factors that impact productivity also play an important role for tenants during leasing decisions—a critical finding for owners as they are looking to attract and retain tenants. In particular, healthy environment and daylighting are critical factors in their leasing decisions.**

Importance of Green Features for Tenant Decision on New Lease or Renewing Existing Lease (According to Tenant Firms)

Source: *The Business Benefits of Green Building SmartMarket Report*, McGraw-Hill Construction/CB Richard Ellis, 2010.



Occupant Perspectives

The people who work in office buildings are the ones ultimately affected by the environment of those spaces. Over time, the industry has become more aware of the impacts that green and energy-efficient features can have on improving the quality of the working experience.

Key Findings from Building Occupant Data

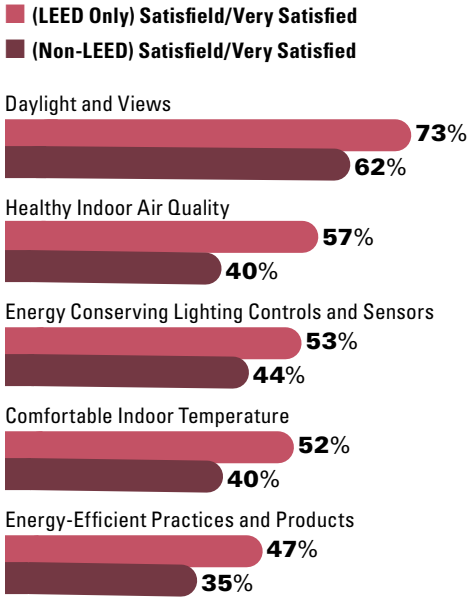
- **People who work in buildings care about features that affect their health. Employers can gain large business savings if they can capitalize on this.**
- **People are satisfied by features they notice. Therefore, it is important for building managers to communicate and engage the people working in their buildings to reap the benefits of green improvements.**
- **People working in Class A LEED buildings are more satisfied with green products as compared to non-LEED buildings. Again, this is likely due to the fact that managers and owners of LEED buildings communicate more often with building occupants to tout their green activities.**

Though currently not a significant influence on an owner's decision-making process, the opinions and preferences of building occupants can place pressures on leasing firms and indirectly impact an owner. Therefore, tapping into this consumer mind-set to reveal larger attitudes and preferences of the public at large could benefit an owner significantly.

Satisfaction with Green Features

(Occupants of LEED versus Non-LEED Buildings)

Source: *The Business Benefits of Green Building SmartMarket Report*, McGraw-Hill Construction/ CB Richard Ellis, 2010.



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Sidebar Data: Business Benefits of Green and Energy-Efficient Retrofit and Renovation Activities

Occupant Perspectives CONTINUED

Motivation Factors

Green features that benefit occupant health and well-being, such as increased daylighting and improved indoor air quality, are considered important by most occupants and are among the top causes of worker satisfaction.

This is reflected in motives for tenant firms in their leasing decisions, demonstrating a direct correlation between attitudes of workers and of their employers (tenant firms).

Impacts

Better lighting and air quality also can positively impact occupant productivity. Considering that healthcare and other workforce costs are a company's largest expense, there is a compelling argument for a company to strive to improve occupant health and well-being and productivity. Green upgrades can help play a role in that.

- **PRODUCTIVITY:** 16% of occupants report productivity increases after a green retrofit and renovation of their building. This finding is a bit higher than what tenant firms report—with 10% expecting productivity increases.
- **OVERALL BUILDING SATISFACTION:** Occupants working in buildings that are Energy Star labeled and/or LEED certified reported higher satisfaction rates after building upgrades—with 54% satisfied and 36% neutral. Only reason reason for the large share of neutral responses is that some of the upgrades undertaken were systems related and likely not as noticeable to tenants. Also, the level of communication about upgrades by building managers has been shown to directly correlate with higher satisfaction levels.
- **GREEN FEATURE SATISFACTION:** A significant portion of occupants of LEED buildings are more satisfied with green features compared to occupants of buildings with only the Energy Star label.

  Particularly noteworthy is the higher satisfaction with daylighting and healthy indoor air quality—the two features with the biggest impact on occupants and tenants. Owners of LEED buildings may find additional marketing value from their efforts—and their certification provides increased opportunity to engage with occupants.

case study

Improving Energy Efficiency in Public Schools through Performance Contracting with Existing Budgets

Mesa County Valley School District 51, Colorado

UPGRADES AND ACTIVITIES ACHIEVING EFFICIENCIES AND COST SAVINGS

Mesa County Valley School District 51 covers 2,200 square miles of Mesa County, Colorado, and includes 43 school campuses and four administration facilities. The school district serves more than 20,000 students. It is the largest employer between Denver and Provo, Utah, with more than 3,200 employees.

The Opportunity

The school district was facing aging systems in its numerous schools. The systems were becoming increasingly expensive and difficult to repair as the frequency of failures increased.

Like many school systems, Mesa County Valley School District faced increasing energy and operating costs along with declining budgets. Many of the buildings had been constructed in the 1980s, with inefficient lighting and no exterior windows in the classrooms.

The First Step: Energy Star and Benchmarking

In 2007, the school district decided to partner with the U.S. government's Energy Star program, making a fundamental commitment to protect the environment through continuous improvement of its facilities' energy performance.

Through the program, the school district evaluated energy use of all its schools and established a baseline for measuring future results of efficiency efforts. The school district realized that it had some good, energy-efficient buildings, but that it also had many very inefficient ones that needed considerable improvement.

Energy Performance Contracting: Investment Solution

At that time, Mesa County had been hit hard by the recession, and the school district was lacking capital reserves. As a result, the school district explored the possibility of performance contracting, which was attractive because the funding essentially would come out of the facilities operating budget over a period of many years, reducing or eliminating the need for up-front capital.

They consulted with the Governor's Energy Office, which had a performance contracting program set up. The program helped them through the steps of finding and choosing a vendor, setting up the contract and beginning the formal technical energy audit.

The school district selected Trane, a large international energy service company (ESCO) with which the school district already had a working relationship, as a primary contractor. Trane brought in Denver-based Financial Energy Management to handle the lighting retrofit, which was the major component of the district's energy efficiency efforts.

Trane also developed the scope of work and determined how much the school district needed to borrow, then developed the three phases of work that would be good payback investments that would fit into a 15- to 20-year time frame

"Replacing aging lighting, heating, and cooling with energy-efficient alternatives can generate big savings, but we lack the capital funds to do those projects. Energy performance contracting provides us a way to make those improvements."

Lighting optimization creates a more pleasant environment for students, teacherts and staff to learn and work.

Mesa County Valley School District 51

CONTINUED

Mesa County Valley School District 51, Colorado

UPGRADES AND ACTIVITIES ACHIEVING EFFICIENCIES AND COST SAVINGS

The Results: Lighting and Mechanical Retrofits Lead to Significant Benefits

The lighting retrofit involved all the school district's buildings, with a total of about 3 million square feet, and accounted for about two thirds of the total project cost. Improvements were made even to buildings that had seen lighting equipment upgrades as recently as four or five years ago.

For example, many buildings had recently replaced old T-12 fluorescent tubes with more efficient T-8 tubes and had replaced metal halide lighting with fluorescents. In the past five years, further upgrades such as installing optical controls and electronic ballasts have become more cost-effective, increasing energy savings even more.

The mechanical and lighting retrofit results are expected to provide electricity savings of over 6.3 million kWh per year. The total cost of the project will be approximately $10 million for lighting and mechanical combined, and it is projected to save a total of $732,828 per year in energy and maintenance costs. With utility rebates, the payback time will be approximately 10 years for the mechanical and lighting retrofits combined.

The school district also opted for the utility provider Xcel Energy's self-directed energy efficiency incentive program, which provides a reward for total energy saved. This self-directed approach is more involved but also more lucrative. For this project, the school district benefited from a rebate of $804,000.

Energy Efficiency Improvements Financed by Performance Contracting

By using performance contracting, the school district did not need to provide any up-front financing. The contractors arrange the financing and will be paid gradually from the energy and operational savings. The school district is guaranteed a minimum level of energy savings ($283,000 per year) and a positive cash flow through this arrangement. The entire retrofit will be paid for out of the school district's facilities operations budget, and no capital funds will be needed.

Eric Anderson, resource conservation manger for Mesa County Valley School District 51, recommends energy performance contracting as a great way to finance energy efficiency improvements at other K-12 school districts as well. He states, "Replacing aging lighting, heating, cooling and controls with energy-efficient alternatives can generate big savings, but we lack the capital funds to do those projects. Energy performance contracting provides us with a way to make those improvements with money we would otherwise be spending on high utility bills."

In fact, schools are one of the sectors suited to performance contracts as long-term owners and occupiers (see sidebar on ESCOs on page 22).

Even though there are slight risks involved—for example, if the energy savings does not pan out in the end—Anderson states that most schools have similar kinds of buildings with similar kinds of challenges and can replicate the success other schools have achieved. ■

stats

Number of Schools
45

Number of Students
20,000

Number of Buildings
79

Square Feet of Building Space
3 million

ESCO
Trane Corporation

Energy Consultant
Financial Energy Management

Total Project Costs
$10,000,000

Payback
10 years

Annual Electric kWh District-Wide Savings
6,367,000 kWh

Annual Natural Gas District-Wide savings
15,359 DTH

Total Guaranteed Annual Savings
$732,828

Xcel Energy Custom Rebate for Phase I lighting Retrofits (September 2010)
$804,000

Xcel Energy Custom Rebate for Phase II and III (Expected)
$500,000

ENERGY STAR Program Partnership
Since September 2007

ENERGY STAR Portfolio Manager (PM) Score (District-Wide)
86 out of 100

Adjusted PM Energy Use Reduction through Dec. 2010
30%

Adjusted PM Energy Use Reduction by End of Phase II and III (Expected)
45%—50%

Energy Star Buildings
24

case study

Using Paybacks to Fund Energy Efficiency in Higher Education

University of California

ENERGY EFFICIENCY PROGRAMS SYSTEM-WIDE AND AT UC DAVIS CAMPUS

In 2008, the University of California initiated a $280 million strategic energy plan encompassing 900 energy efficiency projects across the university system. The goal of the program is to reduce system-wide energy consumption by 10% or more by 2014, using the year 2000 as the baseline measure. According to Dirk van Ulden, associate director of energy and utilities at the university, the program achieved about 70% of its goal by the end of 2010, including "a gross cost avoidance of $21 million and a GHG emission reduction of 93,000 metric tons."

Students Driving Sustainability

The energy efficiency program is part of the university's Sustainable Practices Policy, which was created in 2007 as a response to demands from students, who insisted that the university had social responsibilities beyond educating students in a classroom. The strategic energy plan was formed as one response to these demands.

Using Contractors to Identify Energy Efficiency Activities

Contractors and subcontractors were the key individuals who "roamed all the campuses, looking for opportunities to conserve energy and maybe rebuild some systems to make them more efficient," according to van Ulden. After originally recommending 3,000 projects, the team ultimately settled on 900 activities based on a project's ability to deliver maximum returns in a reasonable time frame.

Self-Funding Program Enabled Initial and Ongoing Investment

The University set up the requirement that the strategic energy plan be a "self-funding effort", though it was predicated on an initial loan. In this case, $280 million was borrowed to pay for the improvements, with the loan repaid from the savings generated by the projects. In order to guarantee that this financing model would work, the University determined that the bond debt service for individual projects could not exceed 85% of the avoided energy costs. Van Ulden explains: "For every $100 that we saved, the project could not cost more than $85."

The fact that the project is self-funding was critical for its adoption. The UC campuses were able to capitalize on their ability to borrow money at a low rate and make the necessary improvements without competing with any other program for limited fiscal resources.

Strategic Partnerships with Utilities by Leveraging System-Wide Activities

Another critical component that allowed the university to create aggressive goals is its relationship with the utilities. Utilities had worked with individual campuses in the past on efficiency projects, but the system-wide effort meant they could create a uniform incentive program across the board.

The advantages to this approach, described by van Ulden, lowered administrative costs for the utilities and increased the incentive structure for the university. The standardized application process for each project allowed the utilities to offer an amount per kWh saved that is "50%–60% above what they would give normal customers." These savings help enable quicker payback of the debt incurred by the initial projects, reducing their overall cost.

The Challenge of Taking a System-Wide Approach

One of the challenges the program faced, according to van Ulden, was gaining buy-in from all 10 campuses and five medical centers that

Photo by Kathreen Fontecha/California Lighting Technology Center UC Davis

The lighting in the parking structures at UC Davis provided an opportunity to implement cutting edge technology.

CONTINUED

case study CONTINUED

University of California

ENERGY EFFICIENCY PROGRAMS SYSTEM-WIDE AND AT UC DAVIS CAMPUS

comprise the UC system. Each has a unique identity as an institution, and they typically operate autonomously. In addition, some campuses were concerned about the impact of the project on their debt ceiling. However, because their campuses would accrue the 15% cost savings exceeding the cost of investment, it was easier to persuade them to get involved.

Before the system-wide strategic energy plan was introduced, the UC Davis campus already had energy efficiency initiatives in place to exceed efficiency code requirements by at least 25%. Therefore, they were engaged by the program from the start, but they still found significant advantages in participating in the system-wide approach. For example, Sid England, assistant vice chancellor for UC Davis, states that the emphasis on a reduced carbon footprint, rather than just operating cost savings, came largely from this initiative.

Implementing New Technologies

The program helped the University system achieve goals beyond reducing its operating costs and carbon footprint. Van Ulden also believes that the university can help lead market transformation through their implementation of new technologies in the commercial buildings sector.

In order to meet the stringent requirements for payback on investment, van Ulden says that their strategy is to consider the overall payback of a combination of projects, with advanced technologies considered along with "very cost-effective programs" to achieve the 85% avoided energy costs.

UC Davis has taken the lead on these projects. The campus' California Lighting Technology Center helped UC Davis achieve the aggressive goal of reducing the energy used for lighting by 60% over the next five years—resulting in 32 million kWh per year and over $3 million in savings, and a carbon footprint reduction of approximately 6.5%. The cost of $39 million requires a longer payback than most of the UC efficiency projects, approximately 15 years, but will help demonstrate the efficacy of the new technologies.

One lighting project they pursued with unexpected benefits was to refit their parking garages with bi-level lighting that gauges the occupancy in the building and reduces lighting in an unoccupied garage to 50%. The technology also proved to be an unexpected security asset. According to England, "If there's anybody in the parking structure moving around, the lights start popping up."

Efficiency Projects with the Greatest Return

Since the strategic energy plan has been implemented, certain technologies and systems have emerged that offer high returns for investment. The university reports that HVAC systems and retrocommissioning are the efforts that yield the greatest returns, with paybacks in retrocommissioning in one to three years.

In particular, van Ulden cites projects that improve the energy performance of laboratories as having the greatest impact, since laboratories are such intensive energy users. ■

University of California Statewide Energy Partnership stats

UC System

10 campuses and 5 medical centers

Total Building Square Feet
Approximately 10 million

Cost of Energy Efficiency Improvement
$80 million as of 12/31/2010

Project Start Date
1/1/2009

Project Completion Date
In progress

Scope of Improvements
Lighting, HVAC control upgrades, motor, chiller and boiler replacements

Products and Technologies
T-8 fluorescent lighting (latest generation), LED and induction lighting, demand control in laboratories, CAV to VAV conversions, central plant upgrades

Process Improvements
Increased building occupant awareness, automated control systems, continuous commissioning

Cost Reductions and Paybacks (as of December 2010)
Energy savings (cost): 7%

Energy Use Reductions:
155 million kWhs and 8 million therms

Energy Savings (Use): 8%
Payback: Less than 7 years

UC Davis Campus

Investment
$44,000,000

Partnership Incentive
$10,145,965

Cost Reductions and Paybacks
kWh Savings: 34,846,232

Therm Savings: 2,364,940

Energy Savings (Use): 18%

kWh Savings: $2,981.830

Therm Savings: $2,152,832

Payback: 6.7 years

Methodology:

Data Section I (pages 10–15):

The data used to track the retrofit and renovation market activity were compiled from the McGraw-Hill Construction (MHC) database of construction projects. Through the Dodge Network, MHC publishes approximately 700,000 reports annually, covering all project types (e.g., nonresidential, residential, nonbuilding). From this pool of projects, MHC draws the Construction Activity Service (CAS) Database, which pulls project information on a monthly basis from the Dodge Network data on projects that have started construction. This database of start projects goes back to 1967. These data are used for analytical purposes, and they form the basis for all of the analysis of market activity represented in this section.

Data Section II (pages 16–39):

In 2009, Siemens and MHC published the *Greening of Corporate America Report,* which featured market research conducted in February and March 2009. Respondents included 203 corporate executives from firms with annual revenues of $250 million and above, which represent over 75% of the then $36 trillion U.S. equities market. These firms include a diverse range of sectors, including manufacturing, pharmaceutical, construction, computer technology, retail, real estate, insurance, energy and natural resources. 78% of the respondents were C-level executives (e.g., CEO, CFO) and the remaining 22% were respondents holding responsibility in the area of corporate sustainability. The survey investigated the broad patterns of corporate sustainability.

The same sample formed the basis for a new research survey conducted in December 2010 presented and analyzed in this report. MHC conducted this study to assess behavior, opinions and perceptions among upper management in corporate America of sustainability and energy efficiency activities in particular.

A sample of 120 corporate officers and high-level managers were contacted, with 50 sustainability officers and 70 general corporate contacts (over 50% were at the vice president level or higher).

To be an eligible respondent, the corporate officers had to meet the following criteria.

- Company revenues of at least $250 million in 2010
- One of the following roles: C-level or head of department division or business unit, vice-president, director of a department division or business unit, or a supervising manager
- Responsibility in at least one of the following areas:
  1. Selecting and installing more energy-efficient products and practices
  2. Setting budgets and getting financing for corporate sustainability initiatives
  3. Establishing benchmarks and performance measures for sustainability initiatives
  4. Promoting the company's corporate governance, ethics, stewardship, or philanthropic activities

Data Sidebar (pages 58–67):

Analysis in this section was conducted using data collected from 2009 to 2010. Some of these data were previously released in different forms in the following studies: *2009 Greening of Corporate America Report*, *Business Benefits of Green Building SmartMarket Report*, and *Green Retrofit and Renovation SmartMarket Report*. However, the results in this study aggregate and analyze these data as a way to help the industry understand—and help influence—the business case for investing in energy efficiency upgrades to existing buildings.

In November 2010, MHC published the *Business Benefits of Green Building SmartMarket Report*, which featured some results of a market survey conducted from July through September 2010. This research investigated the impacts perceived in 150 Energy Star labeled/LEED EBO&M certified buildings under management by CB Richard Ellis (CBRE), interviewing the building managers, building owners and tenant companies. The research was conducted in partnership with CBRE and the University of San Diego.

In October 2009, MHC published the *Green Retrofit and Renovation SmartMarket Report*, which featured some results of a market survey conducted from May through June 2009 with building owners and tenants. 61 building owners and tenants who had conducted green retrofits completed the survey, which was drawn from a sample of 738 office and retail existing commercial buildings managed by CBRE. Respondents were screened on the basis of whether they had owned or occupied space in a building that was at least five years old and that had completed or planned to complete a renovation project that addressed at least two green areas.

Resources

Organizations, websites and publications that can help you get smarter about energy efficiency and green building retrofit and renovation

McGraw-Hill Construction
Main Website: **construction.com,** GreenSource: **greensourcemag.com**
Research & Analytics: **analytics.construction.com,** Sweets: **sweets.com**
Engineering News-Record: **enr.com,** Achitectural Record: **archrecord.com**
Green Reports: **construction.com/market_research**

Federal Government Agencies and Programs

- U.S. Department of Energy (DOE): **www.energy.gov**
- DOE, Office of Energy Efficiency and Renewable Energy: **www.eere.energy.gov**
- Buildings Energy Databook: **http://buildingsdatabook.eren.doe.gov**
- U.S. Energy Information Administration: **www.eia.doe.gov**
- U.S. Environmental Protection Agency (EPA): **www.epa.gov**
- EPA Clean Energy Information: **www.epa.gov/cleanenergy/index.html**
- EPA Energy Portal: **www.epa.gov/energy**
- National Plan for Energy Efficiency: **www.epa.gov/cleanenergy**
- Energy Star: **www.energystar.gov**

National Laboratories

- Pacific Northwest National Laboratory: **www.pnl.gov**
- Energy & Efficiency Division: **www.energyandefficiency.pnl.gov**
- National Renewable Energy Laboratory: **www.nrel.gov**
- Lawrence Berkeley National Laboratory: **www.lbl.gov**
- Environmental Energy Technologies Division: **www.eetd.lbl.gov/eetd.html**
- Ames Laboratory: **www.ameslab.gov**
- Argonne National Laboratory: **www.anl.gov**
- Brookhaven National Laboratory: **www.bnl.gov/world**
- Oak Ridge National Labratory: **www.ornl.gov**
- National Energy Technology Laboratory: **www.netl.doe.gov**
- National Institute of Standards and Technology: **www.nist.gov**
- Savannah River National Labratory: **www.srnl.doe.gov**

White House

- Energy & Environmental Issues: **www.whitehouse.gov/issues/energy-and-environment**
- Council on Environmental Quality: **www.whitehouse.gov/administration/eop/ceq**
- U.S. Department of Housing and Urban Development (HUD): **www.hud.gov**
- HUD, Office of Environment and Energy: **www.hud.gov/offices/cpd/library/energy/index.cfm**
- U.S. Department of Commerce: **www.commerce.gov**
- U.S. Census Bureau: **www.census.gov**

University Programs

- Carnegie Mellon University, Center for Building Performance and Diagnostics: **www.cmu.edu/architecture/research/cbpd/absic-cbpd.html**
- University of California, Berkeley, Center for the Built Environment: **www.cbe.berkeley.edu**
- University of San Diego: **www.sandiego.edu**

Nonprofit Organizations

- Alliance to Save Energy: **www.ase.org**
- American Council for an Energy-Efficient Economy: **www.aceee.org/index.htm**
- American Society of Heating, Refrigerating and Air-Conditioning Engineers: **www.ashrae.org**
- Building Performance Institute: **www.bpi.org**
- Clinton Climate Initiative: **www.clintonfoundation.org/what-we-do/clinton-climate-initiative**
- Database of State Initiatives for Renewables and Efficiency: **www.dsireusa.org**
- Electric Power Research Institute: **http://my.epri.com/portal/server.pt**
- Energy and Environmental Building Alliance: **www.eeba.org**
- National Association of Home Builders (NAHB): **www.nahbgreen.org**
- NABH Research Center: **www.nahbrc.org**
- National Association of State Energy Officials: **www.naseo.org**
- New Buildings Institute: **www.newbuildings.org**
- Pew Center on Global Climate Change, Energy Efficiency Resources: **www.pewclimate.org/energy-efficiency**
- Sustainable Buildings Industry Council: **www.sbicouncil.org**
- U.S. Conference of Mayors, Climate Protection Center: **www.usmayors.org/climateprotection**
- U.S. Green Building Council: **www.usgbc.org**

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