

Benefits beyond Energy Cost Savings

While reduced energy cost is typically the primary driver for energy efficiency improvements and usually justifies a deep retrofit unto itself, buildings that pursue a deep retrofit will benefit from additional positive attributes.

By using an integrative approach to energy-efficient design, a deep retrofit may provide the following benefits:

Owner Benefits	Tenant/Occupier Benefits
<u>Increase in building value</u>	<u>Increased productivity</u>
<u>Higher rent premiums</u>	<u>Higher retail sales</u>
<u>Increased occupancy rates</u>	<u>Reduced employee sick days</u>
<u>Marketing & PR value</u>	<u>Enhanced ability to attract and retain employees</u>
<u>Improved community stature</u>	<u>Improved community stature</u>
<u>Reduced ownership risk</u>	<u>Reduced churn</u>
	<u>Higher student test scores</u>

These benefits, among others, are generally derived from increased occupant comfort resulting from more consistent temperatures, greater control over temperature, airflow and lighting levels, increased availability of daylight, and cleaner, fresher air.

And perhaps most importantly, deep retrofits also provide owners and occupants the opportunity to distinguish themselves in the market, strengthen their reputation and be seen as part of the solution to our energy challenges.

Several of the studies cited below reference LEED certification and/or Energy Star rating, since they provide a recognized distinction of improved



performance. We acknowledge that while achieving certification is not necessarily required to gain the benefits of deep retrofits, it can be an otherwise difficult statistical case to make without those distinctions.

Building Value Increases

Real estate data from green buildings has shown a general trend toward higher rents and sales prices. While building owners responding to a [2009 McGraw Hill Construction survey](#) expected a 6.8 percent increase in value, on average over the next three years, the actual increase in value is likely much higher. One [2009 study on green building rents](#) conducted by Henley University in the UK, found building sale price premiums of 35 percent for LEED certified and 31 percent for Energy Star rated buildings. These certified buildings were compared to a sample of non-certified buildings, controlling for differences in lease contract, age, height, quality, and sub-market. Based on an ongoing study of a national office portfolio managed by CB Richard Ellis, owners of sustainable buildings can expect a five percent increase in building value ([view the CoStar webinar](#)).

Since a variety of attributes have been associated with green buildings—higher occupancy rates, reduced operational costs, higher productivity, etc.—it is unclear as to which factors are most responsible for a valuation premium. In isolating energy efficiency, Henley study researchers identified a return of \$18 in increased valuation for \$1 savings in energy costs from increased thermal efficiency. Improved indoor environmental quality also contributes to the increase in value, since this is one of the most important aspects of workplace satisfaction for employees.



Higher Rent Premiums

According to a [recent study](#) sponsored by the Royal Institution of Chartered Surveyors, Energy Star rated buildings command a three percent rent premium when compared to identical buildings and a 6 percent effective rent premium—the true rental rate incorporating any concessions—spread over the life of the lease. It also found a sale premium of 16 percent on the building aggregate. [Another study](#) published in the *Journal of Real Estate Finance and Economics* found rent premiums as high as 9 percent for Energy Star rated buildings and 17 percent for LEED Certified buildings.

For a tenant, the increase in rent premium does not necessarily correlate to a higher overall cost of occupancy compared to a similar-type, non-efficient building. Energy costs will be significantly lower so there could even be a slight decrease in occupancy cost. Nonetheless, the [McGraw Hill survey](#) indicated that one third of tenants were willing to pay



a premium for green-retrofitted space. While the majority of tenants were willing to pay a one to five percent increase, 16 percent said they would pay more than five percent in additional rent.

Increased Occupancy Rates

Unoccupied buildings cost building owners billions of dollars every year. A [2010 study](#) on the effects of eco-labeling concluded that, after controlling for age, height, building class and quality, occupancy rates are approximately eight percent higher in LEED certified offices and three percent higher in Energy Star labeled offices, when compared to buildings that have not received these certifications. The [McGraw Hill survey](#) of building owners reflected this trend, with 75 percent of respondents expecting increased occupancy due to green retrofits and 27 percent expecting to lease space more quickly.

Increased Marketing & Public Relations Value

Energy efficient operations are becoming an important part of brand identity and brand promotion. Movement towards energy efficiency is an image campaign that is less likely to attract charges of green-washing, particularly if the numbers back up the claims. Until verified energy-efficient operations are considered the norm, efficient operations translate to enhanced reputation value for both private and publicly-traded companies. Reputation value translates to real value as a company is sold.

Lifecycle Expenditures for a Typical Office Building



This value is starting to be recognized by both building owners and tenants. In the [McGraw Hill survey](#), 39 percent of owners and 38 percent of tenants indicated that the competitive advantage offered by having a green building was a motivation for conducting a green retrofit. Additionally, building owners reported that they were including activities that have less direct economic benefits, but that offer additional marketing potential, such as lowering their carbon footprint and using renewable, recycled, and/or certified green building materials. In a [Deloitte and Lockwood study](#), 75 percent of building owners cited public relations value and free publicity as a motivation for undergoing a green retrofit.

Increased Productivity—A \$3 to \$30/SF Value Increase

In the 2010 book, [Greening Our Built World](#), Greg Kats shows multiple peer-reviewed studies that have found connections between improved indoor environmental quality and increased productivity, such as increases in the amount of work accomplished, improved worker retention, and decreased absenteeism.

A deep retrofit that successfully addresses occupant comfort issues, primarily related to ventilation, temperature and lighting, is estimated to add \$3 to \$30 per square feet to the value of office space for the occupant, based on the potential for productivity gains of one to five percent. Since employee's salaries can make up nearly 83 percent of a company's total expenditures, the potential value from

productivity increases is worth far more than an average energy budget of approximately \$2.50 per square feet.

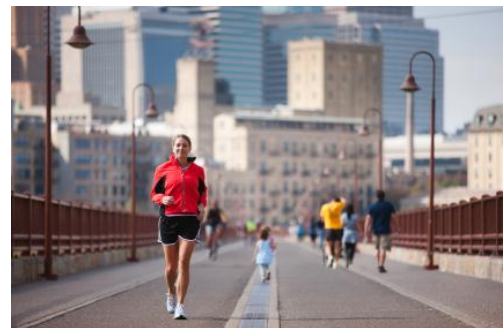
Kats found that productivity increased 3.3 percent, on average, from improving indoor air quality, 5.5 percent for improved temperature control, and 3.2 percent for high-performance lighting systems.

More Daylight Means Higher Retail Sales

[One 1999 study](#) conducted by the Heschong-Mahone Group explored the effects of daylight on retail sales in 108 nearly identical retail buildings. After controlling for hours of operation, population density, average income and the number of years since a store was remodeled, the retail sales in daylit stores were 31 percent to 49 percent higher than in comparable non-daylit stores. [The 2003 HMG follow-up study](#) on a large retail chain supported this finding, stating: “Daylight was found to have as much explanatory power in predicting sales as other more traditional measures of retail potential, such as parking area, number of local competitors, and neighborhood demographics... By the most conservative estimate, the profit from increased sales associated with daylight is worth at least 19 times more than the energy savings, and more likely, may be worth 45 to 100 times more than the energy savings.”

Less Sick Days, Better Employee Health

In a [case study of the Kador Group’s retrofit](#) of 500 Collins Street, significant health improvements were observed post-retrofit. This 28-story building, originally constructed in the early 1970s, now provides more 50 percent the outside air required by Australian standards and was retrofitted with chilled beams. In addition to a 52 percent energy savings, the studied companies reported a 7–20 percent decrease in complaints of headaches, 21 percent to 24 percent decrease in colds and the flu, 16 percent to 26 percent reduction of fatigue, and 5 percent to 20 percent reduction in reports of poor concentration.



Asthma, colds, flu, allergies, sick-building syndrome, and mental health problems have all been linked to poor indoor environments. Therefore, healthier buildings result in healthier people and reduced absenteeism. In his [Greening Our Built World](#) book, Kats offers multiple peer-reviewed studies which demonstrate that improving the indoor environment through activities such as increasing outdoor air flow, controlling moisture problems, providing individual thermal controls, and pollutant source control resulted in a 43 percent reduction in symptoms, on average. Providing access to the natural environment using strategies such as natural ventilation, daylighting, indoor plants, and direct views to the outdoors were found to reduce symptoms by 36 percent, on average.

Healthier people visit the hospital less often and therefore use health insurance less. Reduced group hospital visits should reduce group insurance costs. Since salaries and health care costs dominate the budgets of most companies and public entities, even small improvements in employee health can have substantial financial impacts, potentially much larger than operational energy savings from deep

retrofits. While these linkages are complex and hard to measure, it is an area that warrants further consideration and study.

Enhanced Competitiveness in Attracting and Retaining Employees

People prefer to work in energy-efficient buildings designed to provide fresh air, daylight and a greater sense of control over airflow, temperature, and lighting levels. When prospective employees are interviewing potential employers, indoor environmental quality is a non-economic fringe benefit that people notice both consciously and unconsciously. As people's awareness of energy efficiency increases to include the workplace, employees have shown an affinity for working for companies who operate from energy-efficient buildings. Employees want to work for companies that are doing their part for energy efficiency. In surveys of [tenants](#) and [building owners](#), 71 percent of tenants were motivated to do green retrofit projects because they wanted to "be on board with an important environmental cause" and 69 percent of building owners were motivated by attracting and retaining a quality workforce.

Improved Community Stature & Stakeholder Relations

Governments and citizen groups alike are eager to see energy-efficient buildings constructed. While some governments have developed incentive programs to openly encourage this, high-efficiency buildings are increasingly viewed as helping to ensure a company's right to operate on an ongoing basis. While this effect has not been studied and is nearly impossible to measure, energy-efficient buildings are increasingly considered the right thing to do. The [Deloitte and Lockwood study](#) showed that 88 percent of building owners listed their corporate environmental commitment as a motivation for undergoing a green retrofit.

Lower Churn Rates

The International Facilities Management Association reports a mean annual churn rate of 41 percent for all building types. In government office buildings (with a lower annual churn rate of 27 percent), this churn costs an average of \$1,340 for a simple move to \$3,640 when new walls, wiring improvements, telecommunications systems or other construction was needed. A well-designed, deep retrofit plans for future space reconfiguration, thus minimizing the expense and downtime required to adapt to future tenant needs. These changes may be necessitated by changing company needs or by new tenants. Future space requirements can increasingly be accommodated by flexible wall and mechanical systems. While this is typically not valued



by first-time building owners, long-term owners who have lived through multiple re-configurations are often very comfortable with valuing future flexibility in a capital expenditures cost-benefit analysis.

Reduced Ownership Risk

Legislation to control greenhouse gas emissions will likely impact all energy-using segments of society. While initial upfront increases in energy prices may be softened through government programs, the cost of internalizing greenhouse gas emissions will ultimately increase the cost of operations for all buildings. Closely related to this will be the impact of a building's inherent energy intensity upon its value. While building valuation is a complex, multi-variant analysis, it is safe to say that all buildings that can demonstrate more efficient operations will ultimately be recognized with greater valuations. This seems likely to impact all building owners—large and small alike. Additionally, energy-efficient and green buildings can help to reduce maintenance costs and lessen any potential liability for health problems that are associated with poor indoor environmental quality.

Higher Student Test Scores

A number of studies have shown that student's test scores increase when they study in daylit classrooms. [The 1999 study](#) conducted by the Heschong-Mahone Group stated: "Controlling for all other influences, we found that students with the most daylighting in their classrooms progressed 20 percent faster on math tests and 26 percent on reading tests in one year than those with the least. Similarly, students with the largest window areas were found to progress 15 percent faster in math and 23 percent faster in reading than those with the least."



A [follow-up HMG study](#) that revisited the topic in 2003 concluded that: "We identified a central tendency of a 21 percent improvement in student learning rates from those in classrooms with the least amount of daylight compared to those with the most." As part of a deep retrofit, daylighting reduces the need for electric lighting while also providing a better environment for learning.