WHO PAYS FOR GREEN?
THE ECONOMICS OF SUSTAINABLE BUILDINGS

CB RICHARD ELLIS | EMEA RESEARCH | 2009

CBRE
CB RICHARD ELLIS

CONTENTS

INTRODUCTION

The prominent role of real estate is increasingly recognised in the wider debate on climate change. A significant proportion of carbon emissions come from commercial and residential buildings, and legislation at national and European levels is driving changes to building specifications in an attempt to address this.

The most immediate impacts on the real estate market are being seen through a greater focus on operational energy efficiency and, hence, sustainable development. Growing numbers of corporates are aware of the advantages of occupying "green" buildings, as one element of their broader sustainability goals.

Despite this, buildings with green credentials remain relatively scarce with the result that "track record" evidence of good practice is difficult to find and share across the market. This is partly because "developing green" is still perceived as more expensive, and because the evidence is limited on the commercial rewards of doing so.

This paper touches on several areas of this debate. It reviews the main measurement tools for assessing a building's environmental credentials and assesses evidence on the production cost and rental profiles of green buildings as against conventional ones. There is evidence to suggest that green buildings command a percentage rent premium that is of a similar order to their additional construction costs. Finally, the paper provides some indicators of the running cost savings achievable in buildings of different standards and suggests that these savings offer significant further headroom in terms of potential rent premia.

EXECUTIVE SUMMARY

Driven by a convergence of public sentiment, legislative pressure and technological advances, the issue of sustainability is becoming ever more prominent in society. Because of the contribution of buildings to carbon emissions, the real estate sector is in the forefront of this shift, with much of the focus on operational energy efficiency and sustainable development: the so-called "green building".

The desire to be "green", or to be perceived as such, is increasingly motivating the behaviour of some companies. While some corporates see genuine "social" and marketing advantages in occupying green buildings, investors and developers will ultimately only adopt green practices if it makes good commercial sense. Specifically, developers who incur the additional cost of developing green buildings need to be rewarded for doing so. This raises a range of issues about measuring the attributes of "green" buildings and their adoption, the additional cost of building them and the value payback for doing so.

The evidence base in all these areas is small but growing. It will be important that this growth continues, in order that the commercial (as opposed to the PR) benefits of developing and occupying sustainable buildings is demonstrated through market transactions and values.

For commercial buildings, the two most commonly-used assessment tools at the design stage are BREEAM (Building Research Establishment Environmental Assessment Method) and LEED (Leadership in Energy and Environmental Design). Both headings actually cover a range of schemes for assessing environmental impact, with specific variations applying either to different building types or to different stages in the construction and occupation of a building. These measurement tools are also relatively recent and will undoubtedly be revised and updated over time. While these issues are clearly being taken more seriously, particularly by corporates with a global portfolio - almost 100,000 buildings have been BREEAM certified in the UK - there is currently no single agreed definition of a green building that encompasses all aspects of design, development and use.

"DEVELOPMENT OF A GREENER BUILDING IS LIKELY TO ADD BETWEEN 5% AND 7.5% TO CONSTRUCTION COSTS."

These measures are commonly used in studies of the additional cost of developing green buildings. Taken together the studies reviewed here suggest that achieving the more basic levels of certification may raise development costs by only 2-3% above those for a standard building. Development of a greener building – designed to achieve one of the higher standards of accreditation – is likely to add between 5% and 7.5% to construction costs.

Our own analysis in the residential sector indicates that development of a zero-carbon building (a more onerous environmental standard than even the higher levels of BREEAM and LEED accreditation) could add a construction cost premium of around 12.5%. At any level, costs are much more likely to be held towards the lower end of these ranges where the intention to build a sustainable building is integral to the design and construction process from the outset, rather than introduced as an afterthought.

Since upfront development costs are higher for a green building than for a conventional one, it should be expected that the developer will receive some reward in the form of higher rents and/or lower yields in the investment market. The evidence record for this is limited, but analysis from the US indicates that green buildings do attract higher rents than conventional ones, and also enjoy higher rates of rental growth.

In percentage terms, the rent additionality is of the same order as the excess development cost for green buildings (2-6%), suggesting that some additional premium may need to accrue from yields paid in the investment market. Importantly, however, the evidence for higher rents now includes analysis based on contractual lease rents, as opposed to anecdotal or engineering-based estimates.

"GREEN BUILDINGS ATTRACT HIGHER RENTS THAN CONVENTIONAL ONES, AND ALSO ENJOY HIGHER RATES OF RENTAL GROWTH."

Significant differences also exist in the energy usage and running cost profiles of green buildings as against conventional ones. Clearly this differential is driven mainly by fluctuations in oil prices and energy costs in the market, and it may be that in the short-term, falling oil prices will reduce the scale of cost saving achievable. Nevertheless, evidence suggests that, for any given level of oil price, the energy usage savings on substantially improved buildings, relative to unimproved ones, are very significant. Depending on the level of improvement these savings at least exceed 10% and could be well over 50%.

"AT LEAST 10% AND COULD BE WELL OVER 50%."

The precise rental premium that a tenant might be prepared to pay for a building delivering this level of energy saving is complicated by various factors, including the use of fixed-term energy contracts that insulate tenants against market fluctuations in energy prices. Nevertheless, this suggests that the apparent savings accruing from reduced running costs far exceed the scale of additional development cost, and hence create significant headroom in terms of potential rent premia.

Taken together these strands indicate that the increased future adoption of green building practices is supported by some commercial logic, as well as by environmental desirability.

We believe that the future accumulation of evidence on the relative rent levels, running costs and, in due course, investment prices, of green over conventional buildings, will further reinforce and demonstrate these market differentials. Crucially, by boosting the availability of commercial evidence and reducing the need for developers to make a "leap of faith", this will increasingly encourage the development and occupation of sustainable buildings.

WHY ALL THE FUSS?

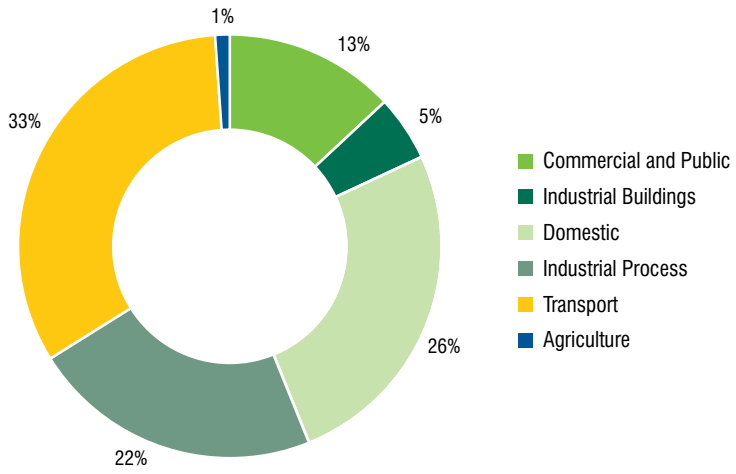
In response to growing concerns about climate change and environmental degradation, the issue of sustainability in all its various forms is becoming ever more prominent in society, and certainly within the business world. Most corporate advertising nowadays contains some claim about the "green" credentials of the company concerned, regardless of whether it is a retailer, an airline or a bank.

The issue, however, extends well beyond corporate advertising, and encompasses a range of changes – actual and potential – in corporate behaviour. One manifestation of this is the rise of socially responsible investment funds: based on a 2006 survey of funds under management, a European Social Investment Forum report reveals that European Socially Responsible Investment funds are estimated to be worth up to €1 trillion - as much as 10-15% of total European funds under management, having increased by over a third since the end of 2002.

Given the degree of social and political interest surrounding climate change, it is not surprising that real estate is under increasing pressure. Figure 1 shows the carbon emissions for the UK in 2003: 44% are generated by all buildings with 18% of the total attributed to non-domestic buildings.

"THE MOST IMMEDIATE IMPACTS ON THE REAL ESTATE MARKET ARE BEING SEEN IN THE AREAS OF OPERATIONAL ENERGY EFFICIENCY AND SUSTAINABLE DEVELOPMENT. THE "GREEN BUILDING" HAS BECOME THE LATEST TRENDY MUST-HAVE FOR CORPORATE OCCUPIERS – AND THE COVER-GIRL FOR DEVELOPERS' ANNUAL REPORTS."

Figure 1: Source of carbon emissions, UK



Source: BRE

The most immediate impacts on the real estate market are being seen in the areas of operational energy efficiency and sustainable development. The "green building" has become the latest trendy must-have for corporate occupiers – and the cover-girl for developers' annual reports.

From an occupier's perspective, occupying environmentally-friendly buildings is an important step towards achieving corporate sustainability objectives – and a very visible statement of corporate principles, and thus has perceived marketing benefits.

While recent falls in energy costs have altered the picture somewhat, an energy-efficient building still offers very real economic attractions to a tenant. Developers are keen to meet these occupier demands, and are thus more willing to incorporate "green" features into their buildings that make them cheaper to occupy. This is made possible by technological advances, which are making it easier and cheaper to build sustainable buildings. Even if such features are not seen as "standard" now, they will be within a few years. Green buildings are therefore increasingly seen as "future-proofed" investments.

"SOME IN THE REAL ESTATE INDUSTRY HAVE BEEN KEEN TO EMBRACE GREEN PRACTICES VOLUNTARILY. DEVELOPERS, INVESTORS AND OCCUPIERS ARE INCREASINGLY FINDING THAT THEY WILL HAVE NO CHOICE."

Most importantly, while some in the real estate industry have been keen to embrace green practices voluntarily, developers, investors and occupiers are increasingly finding that they will have no choice. Government legislation at national and European levels is driving changes to building specifications.

For example in the UK, all commercial buildings new to the market require an Energy Performance Certificate (EPC) on construction, sale or rent, detailing the building's expected energy emissions. As more and more buildings are transacted, EPCs will become available for more stock, significantly raising awareness of the relative energy efficiency of different buildings. Building Regulations are being reviewed on a rolling basis with the next version, expected in 2010, likely to demand increased levels of energy efficiency both through passive measures, like increased insulation, and through the specification of more efficient plant. Local and regional authorities also influence the delivery of lower carbon buildings through demands for the use of renewables for new developments, in some areas demanding that 20% of the building demand be supplied from such sources.

So what's the problem? Given the growing importance of the issue, surely every developer is busy building the most environmentally-friendly buildings that they can in order to lease them to lengthy queues of image-conscious occupiers, before selling them at premium prices to far-sighted long-term investors?

Unfortunately, this isn't yet the case. It is certainly true that more green features are being incorporated into more new buildings, and that assessment of the green characteristics of residential and commercial buildings is becoming more common in occupier decision-making. However, buildings with green credentials are still perceived as more expensive to construct and are not the norm as "track record" evidence of good practice is difficult to find and share among competitors. And for all the rhetoric, commercial organisations will only adopt green practices if it makes good commercial sense to do so. In other words, developers who make the investment required need to get their money back – with an acceptable premium, reflecting the additional risk they have taken.

"THERE IS CURRENTLY NO EVIDENCE-BASED CONSENSUS ON HOW, AND BY WHOM, THE ADDITIONAL COSTS SHOULD BE BORNE."

So who should pay? The occupier, via an increased rent to reflect the lower operating costs of such a building? The investor who buys it, via a lower yield, reflecting the superior income preservation and lower depreciation that will be experienced on a green building? A bit of both? There is currently no evidence-based consensus on how, and by whom, the additional costs should be borne.

In this paper, we examine a number of the key issues in this debate. First, we look at how you can measure and evaluate green buildings. Second, we analyse just how expensive it is to build a green building. Third, we review some of the limited evidence available regarding occupier willingness to pay a premium price to occupy green buildings. Finally, we look at the energy usage savings achievable in green buildings, and consider the impact of these savings on possible rent premia.

HOW GREEN IS GREEN? MEASURING SUSTAINABILITY

As with many aspects of sustainability, there are numerous issues of definition around what constitutes "a green building". There is a whole host of factors which, depending on definition, could be said to contribute to the sustainability of a building. These include amongst other things the site on which it is built, its location, employee travel to work patterns, energy and water consumption and efficiency, emissions, procurement policies, construction materials and waste management.

"THERE IS CURRENTLY NO SINGLE AGREED DEFINITION OF A GREEN BUILDING THAT ENCOMPASSES ALL ASPECTS OF DESIGN, DEVELOPMENT AND USE."

Various techniques and methodologies exist to group and measure these characteristics to assess how "green" a building is. Some only consider very specific aspects of building performance such as energy usage (for example Energy Star), materials used or waste generated during construction or operation. Others try to take a broader view, through a set of design and operational criteria.

For commercial buildings, the two more commonly used at the design stage are BREEAM (Building Research Establishment Environmental Assessment Method) and LEED (Leadership in Energy and Environmental Design), the key features of which are discussed in more detail in Appendix 1.

BREEAM AND LEED

Both headings actually cover a range of schemes for assessing environmental impact. The variations apply either to different building types or to different stages in the construction and occupation of a building. For instance, there are distinct BREEAM schemes for office buildings, schools, leisure buildings, etc. and LEED variations for commercial interiors, existing buildings, schools and retail. Thus, while there is a great deal of similarity between the two systems, there are also some important differences.

A major difference is that, at present, BREEAM focuses on the type of building while LEED focuses on it being new or existing. In some of these areas LEED goes further than BREEAM, for example by requiring building materials to be recyclable. BREEAM awards credits for using recycled materials but does not make it compulsory. In contrast, BREEAM assesses various aspects of the operational use of the building, thus addressing carbon emissions, which are not covered by LEED. However, with so many companies and public authorities adopting carbon neutral targets, it is almost certain that emissions will become part of LEED's accreditation process in the next few years.

One important consequence of these differences is that a building which is highly rated under one system will not necessarily score so highly under another. Indeed, buildings which are awarded the same rating under the same system are not necessarily equally "green"! This is because the ratings take account of local conditions, local building codes and standards and how designers or occupiers go beyond the minimum required. A "pass" score in BREEAM assumes compliance with Building Regulations; extra credits are awarded only for features above those already required. This is important because both BREEAM and LEED have been adapted and used to rate buildings outside their "home" country. As a result, the baseline between countries is different as building regulations (or building codes) are more demanding in some countries than others. One therefore cannot assume that a building certified as LEED Silver in one location is just as "green" as another LEED Silver building in a different country.

There is a lack of understanding in the market place about what a particular rating means or implies, making it difficult to use the label across boundaries especially for corporate clients. In essence, there is currently no single agreed definition of a green building that encompasses all aspects of design, development and use.

WHY ARE THESE TOOLS USEFUL?

Leaving aside these differences, BREEAM, LEED and other Building Assessment Tools are useful in that they provide some form of objective assessment of a building's "greenness". The public sector has tended to be the driving force behind the demand for 'greener' buildings – and the adoption of independent ratings – on both sides of the Atlantic.

In the United States, cities including New York, San Francisco and Seattle have adopted green building programmes and New York became the first state to grant a tax break for sustainable buildings. American universities and environmental organizations have also been at the forefront of the adoption of LEED to certify their buildings.

Similarly, in the UK, local authorities and central government specify that a minimum BREEAM rating be achieved for the buildings they occupy. The UK Office of Government Procurement requires all government departments when undertaking new build or refurbishment construction projects to carry out environmental assessments using BREEAM. From March 2003, all new buildings have had to achieve a BREEAM "Excellent" rating and refurbishment projects a "Very Good" rating.

Measurement issues are also increasingly important to the private sector. More and more corporate occupiers are seeking to occupy "greener" buildings, and measurement standards give them a tool for setting targets or standards and measuring progress in achieving them. Thus far, many corporate occupiers have prioritised having a "green" headquarters building, rather than applying such standards across their whole property portfolio. Equally, some large corporates like Deutsche Bank, KPMG and HSBC are raising internal awareness of green issues in real estate by assessing their portfolios (usually utilising either LEED or BREEAM) and setting targets or objectives for upgrading their portfolios.

There are still commercial limits to corporate efforts to appear green in their real estate activities. Many companies conclude, rightly, that it is usually not cost-effective to retro-fit an existing building simply in order to make it "greener", or to relocate to a new building simply in order to improve the "green-ness" of the portfolio. In these instances it is generally considered that the costs outweigh the benefits.

A common strategy is therefore one of "incremental improvement", whereby green considerations are taken into account every time a real estate decision is made. In effect this asks the question "what can we reasonably do here that is both cost-effective and will make our portfolio more sustainable?". Refurbishments, as and when they are required for other reasons, are also appropriate opportunities to review options for retro-fitting more sustainable features.

"AS IMPERFECT AS THEY ARE, THESE ASSESSMENT METHODS ARE HELPING DRIVE TRANSPARENCY, OBJECTIVITY AND ADOPTION OF GREEN BUILDING TECHNIQUES ACROSS THE MARKET."

GROWING ADOPTION OF GREEN TECHNIQUES

What is clear is that these issues are being taken more seriously by occupiers in both public and private sectors. In the UK there are almost 100,000 buildings certified and nearly 700,000 homes and buildings currently registered for assessment against BREEAM. LEED is less well advanced, with only 1,000 buildings already rated – but with a further 9,000 now registered for appraisal. As imperfect as they are, these assessment methods are helping drive transparency, objectivity and adoption of green building techniques across the market.

However, the crucial issue for both owners and occupiers is "cost effectiveness". What reward will the market offer for incurring the cost of developing sustainable buildings? Developers, investors and tenants are not – in general – charities. They will only build, buy or lease green buildings if they offer performance and value for money which is at least comparable with, and preferably superior to, a conventional building. This raises the thorny issue of money: how much do green properties cost to build, and who should pay for them?

THE ECONOMICS OF GREEN BUILDINGS

A. THE COSTS OF PRODUCING GREEN BUILDINGS

Many organisations concerned with the development, maintenance and refurbishment of real estate know relatively little about the true cost of sustainability. In part this is down to difficulties in defining "sustainability" – what exactly would an "unsustainable" building look like? With the significant changes in building regulations and policy that have occured it is neither practical nor desirable for any developer to ignore environmental concerns. So what is the actual difference in production cost between a "green" building and a conventional one? Hard evidence is somewhat limited but, helpfully, such evidence as does exist appears to reach broadly similar conclusions.

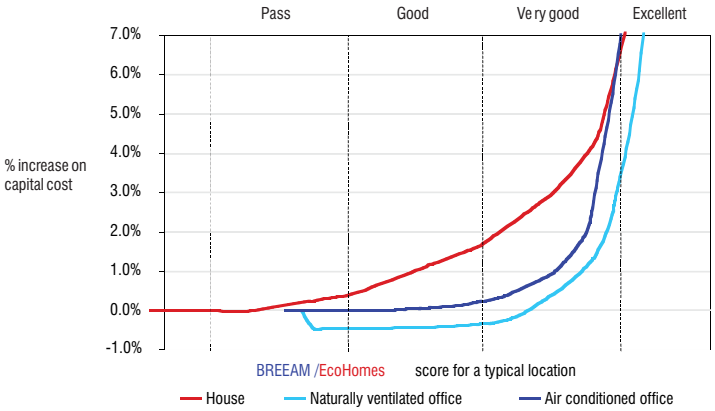
A study undertaken by BRE and Cyril Sweett investigated the marginal increases in construction cost required to achieve different BREEAM ratings. Using a typical building for each of the categories studied, the analysis explored the marginal increase on capital cost to achieve BREEAM and EcoHomes ratings at the time of the study (2003-4) for three different types of building:

- A house
- A naturally ventilated office
- An air-conditioned office

The study concluded that, subject to certain conditions, the environmental performance of a new building can be increased by 1-3 ratings for less than 2% additional capital cost [2], provided the conditions are optimum and the most cost-effective measures are implemented. In the case of a naturally ventilated office a negative increase (ie a net saving) was achieved due to the reduced cost of plant compared when with standard build cost.

Higher environmental standards cost more. The development of projects that command the higher ratings between "good" and "excellent" incur costs up to 7% higher than those of conventional buildings (See Figure 2).

Figure 2 : Increasing capital costs against environmental performance for three building types



Source: "Costing Sustainability" BRE Information Paper 4/05 (2005)

Estimates based on American projects assessed using the LEED process initially indicated an increase of 0-3% in capital cost for the lower ratings, and up to 6.5% cent for the highest ratings. A later review of 138 buildings with varying commitment to the environment (93 non-LEED and 45 LEED seeking buildings) found the overall costs to be indistinguishable. There were wide variations in the building cost but "there was no statistically significant difference between the LEED population and the non-LEED population" [3]. This study was revisited in 2006 [4] and reached essentially the same conclusion: there is no significant difference in average costs for green buildings as compared to non-green buildings.

Figures published by the US Green Building Council (USGBC), which are considered conservative, also indicate that there are no extra construction costs involved in achieving basic certification. However, achieving silver accreditation incurs a cost premium of about 1.5%, and up to 7% additional construction costs for platinum. According to independent surveys of those meeting LEED certification, the average costs are reported to be about 3% extra rather than the zero figure provided by the USGBC (for basic certification).

Overall, these studies therefore suggest that achieving basic certification need not cost significantly more than a standard building, particularly if the intention to build a sustainable building is integral to the design and construction process from the outset. However, building a greener building – designed to achieve one of the higher standards of accreditation – is likely to add somewhere between 5% and 7.5% to construction costs.

GOING BEYOND

These studies use existing measurement tools as the framework for analysis. Existing BREEAM or LEED certification levels may be a convenient analytical benchmark, but even their highest levels of accreditation are far from "the ultimate" in sustainability. Indeed, the recently launched "BREEAM 2008" revised standards introduce a new "Outstanding" classification at the top of the scale. Beyond even this, the issue of "carbon neutrality" has become a feature of recent policy discussions in both the public and private sectors. Carbon-neutral development goes well beyond the requirements of either BREEAM-Excellent or LEED-Platinum accreditation, but is the current long-term target of local government in England.

Research carried out by CB Richard Ellis compared the standard costs of construction in England for a 12-storey, 50-unit residential development totalling around 80,000 sq. ft. with a theoretical zero-carbon development of the same size[1].

This analysis indicates that building the zero-carbon scheme incurs a construction cost premium of around 12.5%. Whilst clearly significant, this appears a surprisingly modest premium for achieving what is actually a very demanding environmental standard. It should be noted however that the cost of sustainability varies enormously, depending on the type, scale, location and energy use of a development. It is also likely that, over time, this premium should fall as zero-carbon technology becomes cheaper, more standardised and thus quicker and easier to incorporate into the design and construction process.

"ACT EARLY TO MINIMISE THE ADDITIONAL COST OF DEVELOPING GREEN."

MINIMISING THE ADDITIONAL BUILD COST

Building green is not just a matter of incorporating additional design features such as solar panels. The whole process of applying for environmental accreditation using LEED or BREEAM is expensive in its own right, and increased design time does add costs. Independent consultants need to be appointed and evidence collected to show that the credits or points are deserved. Sourcing the right materials, using the right professionals and securing suitable design features represent an "environmental levy" that is not always easy to calculate and that businesses are not always willing to pay. In addition, some studies note wide variations in the responsiveness of planning and building control authorities, which will clearly introduce market-specific variation in total development costs.

At the same time, formal accreditation does have the advantage of "certifying" a particular level of green-ness, which in itself confers some value on a property. It may be difficult to assess exactly what value a given rating confers, but it does seem likely that this value will increase in the future.

1 *The design, by architects Lewellyn Davies Yeang, is set to a zero-carbon standard for green design and construction, albeit excluding procurement or demolition. To narrow the scope of this research and to define the type of product being analysed, it was assumed that:*
- *the development is within urban Britain;*
- *it is of tower design;*
- *the design and mix has a typical city occupier mix of mostly professionals and young families;*
- *although Llewelyn Davies Yeang approach to building design is site-specific, we have attempted to remove issues of aesthetic.*

This is one of the reasons why achieving the relatively modest increases in construction cost indicated by various studies depends on early decisions being made regarding basic form and servicing solutions. Cost-effective solutions are dependent on a design and specification with BREEAM or LEED in mind from the very beginning of the project. "Greening" a building that has been designed without a sustainability brief will undoubtedly be more expensive and potentially achieve less satisfactory results in terms of comfort and operational and maintenance costs over the lifetime of the building. In other words, act early to minimise the additional cost of developing green.

"WHILST NOT ALL SUSTAINABLE FEATURES ARE NECESSARILY MORE EXPENSIVE, AND THE CONSTRUCTION COST PREMIUM FOR BUILDING SUSTAINABLY MAY BE FALLING, IT REMAINS THE CASE THAT A GREEN BUILDING IS LIKELY TO BE MORE EXPENSIVE TO CONSTRUCT THAN A CONVENTIONAL ONE."

B. DEMAND FOR GREEN BUILDINGS: DOES GREEN ADD VALUE?

Whilst not all sustainable features are necessarily more expensive, and the construction cost premium for building sustainably may be falling, it remains the case that a green building is likely to be more expensive to construct than a conventional one. Based on the studies cited above, additional build costs appear to lie in the 0-2% range to achieve the basic end of currently recognised accreditation levels, and up to 7% for the higher levels. The additional costs for zero-carbon development are likely to be even higher than this.

A key issue, therefore, is who will pay? The answers, and indeed the issues involved in interpreting the apparent answers, may well differ between the commercial and residential sectors. The following sections provide some evidence for both.

EVIDENCE FROM THE RESIDENTIAL SECTOR

Some initial information comes from the residential sector. At their Kennet Island sustainable residential scheme in Reading, England, developer St James' investigated consumer willingness to pay some portion of the additional cost for green developments.

The St James' envirohome concept, including the cost of installing key green features, was explained to prospective purchasers at the show home. The survey revealed that four-fifths of residents would pay up to £3,000 for each of a select group of green features, including solar PV tiles, solar hot water tiles, PowerPipe hot water heat exchangers, grey water recycling and wind turbines. However, this figure is less than the cost of installation for any of these items with the exception of rain water recycling. While 30% of consumers indicated a willingness to pay over £10,000 for a fully fitted 'envirohome', a majority valued the envirohome at a level well below its full cost [6].

The survey is not necessarily statistically robust as a representative sample of the rest of the UK; located within the affluent south east of England at a time of rapidly rising house prices, this study may overstate residential purchasers' willingness to pay for green features in their homes. It is encouraging that there appears to be significant degree of goodwill towards sustainability. However, at present this is insufficient for adoption of green technology at current prices. The survey demonstrates that without recognized cost savings from adopting green technology, consumers consistently undervalue the true cost of these features.

Part of the difficulty in assessing attitudes to value in the residential sector is that house buyers do not always take a financially "rational" approach to property values and prices. In theory, they should be perfectly capable of making the same calculations regarding, say, energy costs as a commercial landlord. Thus they should be prepared to pay more for a house that uses less energy and is cheaper to run. The difficulty is two-fold.

First, how many of the general public are equipped to do this discounted cashflow calculation to calculate the present value of future energy cost savings (including making an assessment of the correct discount rate to apply, allowing for the fact that they are probably financing the purchase using a long term variable rate mortgage)?

"THERE IS SOME EVIDENCE THAT GREENER BUILDINGS ARE BEING VALUED MORE HIGHLY THAN CONVENTIONAL BUILDINGS."

Second, house buyers are often constrained in their ability to purchase a house by the size of the mortgage they are able to secure, which governs the absolute amount they can spend. Thus, if a purchaser has a total budget of £180,000 to spend, what would they rather purchase? A "£160,000 house" with £20,000 of green technology, which will deliver them a subsequent "income" in the form of energy cost savings over the coming years? Or a conventional £180,000 house which is bigger, or better located, or with a larger garden?

RENTS AND VALUES IN COMMERCIAL BUILDINGS

One would expect that businesses owning or occupying commercial property would be more sophisticated and rational in their decision-making. However, this may not always be the case!

A recent study based on data collected by the CoStar Group shows some evidence that greener buildings are being valued more highly than conventional buildings. Within their database of around a quarter of a million commercial properties in the United States, some have had their energy efficiency rated using Energy Star[2]. From these buildings, a selection complying with a specific set of criteria was analyzed.

The criteria used for filtering the database included:

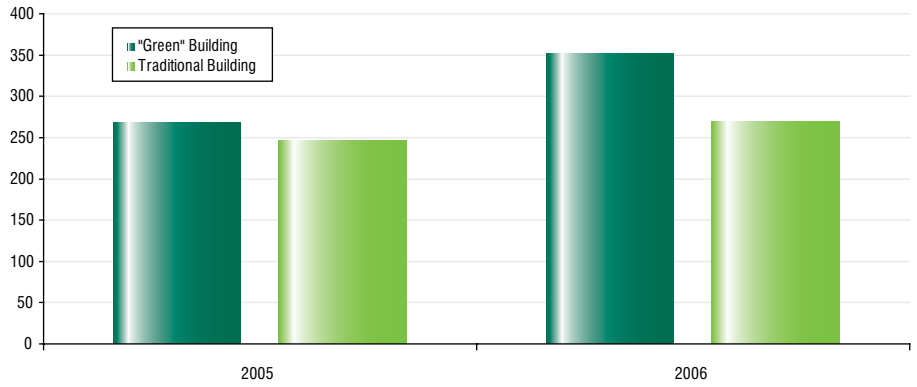
- Class A office buildings
- 200,000 square feet or more
- 5 stories or more
- Built since 1970
- Multi-tenanted

This resulted in a sample of 223 buildings rated using Energy Star compared with 2,077 Non-Energy Star buildings.

Analysis of the samples showed that:

- The more energy efficient "green" buildings attracted rents per sq ft that were around 6% higher than traditional buildings;
- Over the fifteen months analysed, the average rent on the green buildings rose by 8.2%, compared with 7.6% growth on the traditional buildings;
- The green buildings appeared to secure a sale price premium of around 9% in 2005 and as much as 30% in 2006

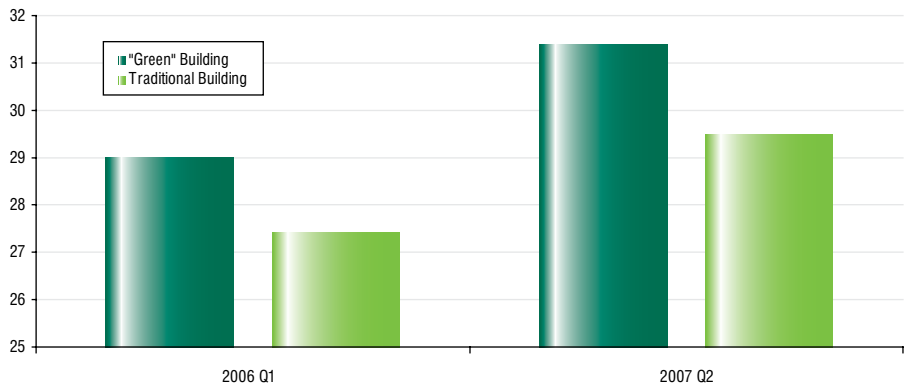
Figure 3: Direct Rental Rates ($/sq.ft.)



Source: Miller, Spivey and Florance (2007)

2 *The sample contained 435 buildings rated using Energy Star compared with 238,808 Non-Energy Star buildings. Energy Star is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy providing an energy performance rating of the building energy consumption profile. It has a narrower scope than LEED but can be used as a proxy for 'green' buildings in the context of the study as Energy Star buildings are those within the 25% most efficient buildings for energy conservation.*

Figure 4: Sales Price ($/sq.ft.)



Source: Miller, Spivey and Florance (2007)

"ENERGY REPRESENTS AROUND 30% OF OPERATING EXPENSES IN A TYPICAL OFFICE BUILDING, MAKING IT THE SINGLE LARGEST COST ITEM AND, POTENTIALLY AT LEAST, A SUBSTANTIAL ELEMENT OF MANAGEABLE EXPENDITURE."

The study also found that Energy Star buildings had consistently higher occupancy levels dating back to the fourth quarter of 2004 [5]. This would imply that owners of green buildings would see a higher income return from their portfolio, as they would have greater success in converting theoretical rental value into actual rental income from occupied property. If borne out more widely, this ought to become apparent in lower yields, and hence higher unit values, for green buildings.

Further analysis by Eicholtz et al [7] also compared the rental difference between a sample of Energy Star and LEED-rated office buildings in the US with non-rated buildings in the immediate vicinity. Importantly, the comparison is based on actual contractual lease rents as opposed to anecdotal or engineering-based estimates.

The study finds that rents for green offices are about 2% higher than those for comparable buildings located nearby. Effective rents, adjusted for respective occupancy levels, show a rent differential of around 6%. The authors estimate that at prevailing capitalisation rates, conversion of the average non-green building to an equivalent green building would add over $5m in market value.

Some evidence therefore exists that green buildings do command higher rents than conventional ones. In percentage terms, the rent additionality is of the same order as the excess development cost for green buildings, suggesting that some extra may need to accrue from yields paid by the investment market. This would be consistent with findings quoted in Eicholtz et al, that the lower risk associated with a tenant of high social reputation should result in a higher building valuation, even if it does not command a higher rent. It is also consistent with earlier indications that green buildings command higher occupancy levels.

C. OPERATING COSTS AND ENERGY PRICES: THE PAYBACK FOR GREEN BUILDINGS?

The relationship between the higher initial cost of producing sustainable buildings, and the lower cost of subsequently running them (via impacts on tenants' ability to pay higher rents), is key to understanding the viability of pursuing green development. Energy represents around 30% of operating expenses in a typical office building, making it the single largest cost item and, potentially at least, a substantial element of manageable expenditure.

Some evidence can be offered on the reduction in energy usage, and therefore running costs, in buildings of different environmental characteristics. Analysis has been undertaken using an existing building that has recently had an Energy Performance Certificate (EPC) completed. The building's rating was found to be at the bottom of the EPC scale and rated at G. The building was constructed in the 1970s and had an area of 13,600 square meters. The ground floor consisted of retail units with the 1st and 2nd floors being office tenancies.

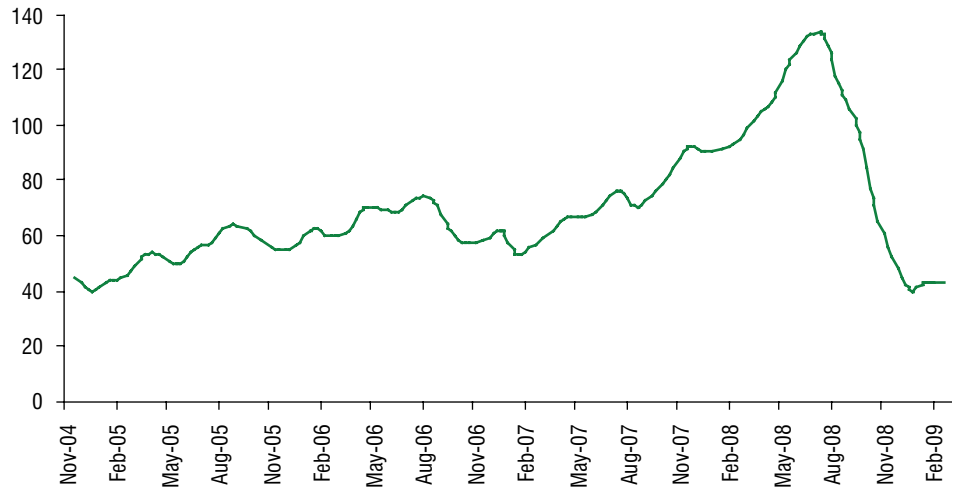
An exercise has since been undertaken to introduce two additional stages of enhancement to the building. The aim was to ascertain the requirements to improve the rating and the consequent reduction in energy consumption of the building. The tool used to achieve the original EPC and the theoretical results was the government-approved iSBEM.

Estimates of energy consumption were generated under each of three scenarios:

SCENARIO 0	Standard three-storey building with gas fired radiators is as the building stands, with no enhancements. **597 kWh/m2/yr** **G Rating**
SCENARIO 1	Double glazing and Roof refurbishment installed to meet current regulations **526 kWh/m2/yr** **G Rating** *(-12% in energy consumption from scenario 0)*
SCENARIO 2	Enhanced Capital Allowances (ECA) qualifying heating and ventilation systems, efficient lighting and high quality maintenance **131 kWh/m2/yr** **B Rating** *(-78% in energy consumption from scenario 0)*

In absolute terms, the magnitude of potential cost savings that could arise from this will depend on fluctuations in raw energy costs, which can be proxied by oil prices. Oil prices have fluctuated dramatically over the past year, rising from just under $90 per barrel in November 2007 to nearly $140 per barrel in the middle of this year since when, as the credit crunch and weaker global demand have taken hold, prices have fallen steeply to under $55 per barrel (See figure 5). The average price over this period has been just under $70 per barrel.

Figure 5: Oil Prices, ($US per barrel, 2004- 08)



Source: Ecowin

On the basis that overall energy usage costs in commercial buildings bear some relationship to headline energy prices, for any given level of oil price the savings highlighted in the scenarios above may be achievable. Indeed, assuming a linear relationship between oil prices and energy usage costs, the cost of running a fully- improved building would be lower at a $100 per barrel oil price than the cost of running a "standard" building at an oil price of $30 per barrel. In the short-term, however, falling oil prices may inhibit the adoption of green buildings by reducing the absolute scale of cost saving achievable.

Nevertheless, the evidence suggests that the savings accruing from reduced running costs create significant headroom in terms of potential rent premia. Combined with the indications that green buildings display stronger rental growth profiles, this ought to be reflected over time in a clearer yield differential between green and conventional buildings. This would provide far-sighted developers with an additional source of payback, and accelerate the adoption of green development techniques.

"EVIDENCE ON RENTAL TRANSACTIONS INDICATES THAT GREEN BUILDINGS ACHIEVE A RENTAL PREMIUM SIMILAR IN PROPORTION TO THE SCALE OF ADDITIONAL DEVELOPMENT COSTS FOR MID-RANGE LEVELS OF CERTIFICATION."

CONCLUSIONS

The sustainability agenda will continue to grow in importance in the real estate sector, and will increasingly affect the behaviour and decision-making of occupiers, investors and developers. While there is currently no single agreed definition or measure of what constitutes a "green" building, the tools that exist for assessing the environmental credentials of a building are becoming more widely used and accepted.

Such evidence as there is indicates the excess cost of developing a green building, relative to that for a conventional one, ranges between around 2-7% depending on the level of accreditation sought. Even the ambition of producing a zero-carbon development - which is more demanding than even the highest levels of BREEAM or LEED accreditation – would potentially add less than 15% to development costs.

There are still a number of unresolved issues in assessing the scale and source of payback for incurring these additional costs, particularly in terms of investment value and pricing. However, evidence on rental transactions indicates that green buildings achieve a rental premium similar in proportion to the scale of additional development costs for mid-range levels of certification.

Recent sharp falls in oil prices notwithstanding, the savings in energy usage costs appear even more substantial, suggesting that the occupation of green buildings offers significant headroom in terms of potential rent premia. We believe that the future accumulation of evidence on the relative rent levels, running costs and, in due course, investment prices, of green over conventional buildings, will reinforce these market differentials. Crucially, by boosting the availability of commercial evidence, this will increasingly encourage the development and occupation of sustainable buildings.

REFERENCES

1. BRE Report BR 442 2002: Carbon Emissions from Non-domestic Buildings. Updated by the authors with figures from The Carbon Trust and DUKES (BERR).
2. BRE Information Paper 4/05: (2007) Costing Sustainability: How much does it cost to achieve BREEAM and EcoHomes ratings?.
3. Matthiessen, L. and Morris, P. (2004): Costing Green: A comprehensive cost database and budgeting methodology. (Davis Langdon)
4. Matthiessen, L. and Morris, P. (2007): Costing Green Revisited. (Davis Langdon)
5. Miller, N., Spivey, J., and Florance, A. (2007) Does Green Pay Off? (Burnham-Moores Center for Real Estate, San Diego University / CoStar)
6. Envirohome Brochure, StJamesHomes.co.uk, and Envirohome Feedback Questionnaire results
7. Eichholtz, P., Kok, N. and Quigley, J. (2008) Doing Well by Doing Good? Green Office Buildings, Working Paper No W08-001, Fisher Center for Real Estate and Urban Economics, University of California, Berkeley

APPENDIX 1

ENVIRONMENTAL ASSESSMENT METHODS: BREEAM AND LEED

BREEAM - BUILDING RESEARCH ESTABLISHMENT ENVIRONMENTAL ASSESSMENT METHOD

BREEAM is the world's longest established and most widely used environmental assessment method for buildings. It sets the standards for best practice in sustainable development and provides a recognised level of achievement.

BREEAM is an assessment tool developed in the UK that rates the performance of buildings based on their environmental impact or measures taken to avoid such impacts. A building is rated on management, energy use, health and well-being, pollution (air and water), transport, land use, ecology, water consumption and efficiency, and materials. BREEAM has recently gone through a step change to come up with the new set of tools known as BREEAM 2008.

Major differences compared to the previous version (BREEAM 2006) include:

- Previously buildings were certified as pass, good, very good, or excellent. A higher rating is now available for exceptional buildings, which will be called 'Outstanding'.
- Introduction of mandatory minimum requirements in some areas (e.g. sub-metering, water consumption, CO2 emissions).
- More demanding requirements to achieve some credits
- Change to the weightings used for each category.
- Introduction of a post-construction stage (to check that those features assessed at the design stage have been maintained during construction and initial occupation)

In the UK 65,000 buildings have been certified to date and a further 270,000 are currently registered for assessment[3].

BREEAM has been used to certify buildings in the UK, Ireland, Hong Kong and Canada.

3 *This figure includes data for EcoHomes, the BREEAM scheme applicable to residential developments*

LEED - LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN

The LEED green building rating system was originally developed by the US Green Building Council (USGBC). Largely based on BREEAM, it provides a recognised standard for the construction industry to assess the environmental sustainability of building designs. LEED promotes integrated whole-building design, with the overall aim of reducing a building's environmental impact. LEED provides a framework for assessing building performance and meeting sustainability goals and like BREEAM, it produces a point-based rating system. The USGBC has attracted over 6,500 paying members bringing in over $24 million a year. Despite this, since it was formed in 1995, just over 1,000 buildings have obtained LEED accreditation with about 9,000 projects registered for assessment.

LEED has been used to certify buildings in USA, Canada, India, China, Brazil, UAE, Mexico, Argentina, Italy and Spain.

COMPARISON

Table 1: BREEAM vs. LEED

SYSTEM	CRITERIA	SCORING
BREEAM	1. Management (policy, commissioning site management, procedures). 2. Energy (operational use, CO2). 3. Health and well-being (indoor and external issues). 4. Pollution (air, water). 5. Transport (CO2, location factors). 6. Land use (green fields, brown fields). 7. Ecological value of site. 8. Materials (including life-cycle impacts). 9. Water (consumption and efficiency).	Credits awarded for each criterion. Weightings applied to produce overall score. Score translated into rating and a certificate awarded: 25-39 Pass 40-54 Good 55-69 Very good 70 or more Excellent Updated regularly[4].
LEED	1. Site 2. Energy 3. Water 4. Materials 5. Indoor environmental quality	Credits specified for each criterion (7-12 in each area). 29 out of 69 is the minimum required to obtain a certificate. User selects criteria for scoring. Prerequisites must be met. Rating based on total number of points scored. The building is given a special designation if more than 50% of the credits are achieved: 50-60% Bronze 61-70% Silver 71-80% Gold 81% or more Platinum Updated every three years.

4 *In England and Wales, Building Regulations dictate the baseline and changes and updates in the regulations trigger an update in the BREEAM criteria*

CONTACTS

ENERGY & SUSTAINABILITY GROUP
Charlotte Eddington
Director
t: +44 207 182 3490
e: charlotte.eddington@cbre.com

Darren Berman
Director
t: +44 207 182 3252
e: darren.berman@cbre.com

BUILDING CONSULTANCY
David Hitchcock
Executive Director
t: +44 207 182 3345
e: david.hitchcock@cbre.com

Stefan Desormeaux
Director
t: +44 207 182 3632
e: stefan.desormeaux@cbre.com

RESEARCH
Dr. Nick Axford
Executive Director
t: +44 207 182 3039
e: nick.axford@cbre.com

Richard Holberton
Director
t: +44 207 182 3348
e: richard.holberton@cbre.com

FSC ecf

This document is produced using FSC (Forest Stewardship Council) certified paper, which is made of 50% wood from sustainable forest, and 50% post consumer reclaimed material. This paper is produced from an ECF (Elemental Chlorine Free) process - a definition for pulp bleached without using Elemental Chlorine. Vegetable based inks were used throughout the print process and the brochure is finished in a Biodegradable laminate. This brochure is recyclable.

CBRE
CB RICHARD ELLIS

www.cbre.eu/environment