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IS SUSTAINABILITY REFLECTED IN
COMMERCIAL PROPERTY PRICES:
AN ANALYSIS OF THE EVIDENCE BASE

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Is sustainability reflected in commercial property prices: an analysis of the evidence base

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EXECUTIVE SUMMARY

Over the last decade there have been increasing column inches devoted to the articulation of a so-called business case for sustainable property. Much of this relates to difficulty that has been encountered by investors and developers active within the commercial property markets to find ways of embracing the sustainability agenda and justifying any additional build costs that might be incurred by investing in so-called 'green' buildings. In particular the key question has been: will such investment result in superior financial returns in the shape of either, or both, increased rents or lower yields.

The aim of this research project was to establish the extent to which, if at all, there is material in the public domain which can be used to support the contention that there is an observable link between the financial performance of commercial properties and their sustainability credentials.

The findings of the research were:

Assessing the Evidence

- Very few large-scale empirical studies have been undertaken. However, three recent studies undertaken in relation to US office buildings (Miller *et al.*, 2007; 2008; Fuerst and McAllister, 2008; and Eichholtz *et al.*, 2008; 2009) claim some rental value differentiation in respect of accredited buildings with those that are not. The evidence base does not distinguish between grades of accreditation and all authors point to the very preliminary nature of the findings. Substantive evidence of capital value shift was not found.
- Whilst no empirical evidence of capital value differentiation has yet come through, within the UK, Investment Property Databank (IPD) are now beginning to track performance of a small number of buildings against their sustainability credentials but, although initially launched, no significant results are expected for some years.
- Opinion was abundant and formed a significant part of the study. Most of this work has been undertaken by real estate consultants, and stretches from the UK, to Europe, the USA and Australia. Many of these surveys indicate that potential occupiers state that they would be prepared to pay more for green or sustainable buildings, even in the downturn, on the grounds of potential cost savings. However, when tested in actual behaviour there is not the evidence that this is happening (Dixon *et al.*, 2009).

- There is a burgeoning body of theoretical literature that make the case as to why there should be a value differential. Often these are based on examination of worth appraisals, using DCF techniques. The work of Boyd (2005); Guertler *et al*, (2005); Robinson (2005); Ellison and Sayce (2006); Ellison *et al* (2007); Bienert *et al* (2008); Lorenz and Lutzkendorf (2008[a] and [b]); and McNamara (2008) all argue a value and sustainability relationship *should* be developing. The merits of these studies lie in their contribution in informing market players and promoting deeper understanding of sustainability related issues. There is also an acknowledgement that legislation and ethical considerations may play an increasing role moving forward.
- Much of the literature argues that sustainable buildings are worth more to occupiers, based on grounds that they are more economic to run and offer better working environments. Authors such as Kats (2003) and Robinson (2005) as well as RICS's 2005 *Green Value* report point to occupational value benefits. However any evidence that tenants will be willing to pass on their cost savings in the way of additional rent is not proven, so the investment case lies in the presumption that such buildings will retain tenant attractiveness and therefore be less subject to obsolescence. Put against this, some recent studies (Turner and Frankel, 2008; Paul and Taylor, 2008) point to green buildings not always performing as expected given their specifications.

Characteristics of the Literature

- There is, as yet, little academic literature on the subject; although a few major studies are now coming through and there are some peer-reviewed journal articles, opinion articles from the professional press and research reports by consultants constitute almost half the substantive literature.
- Overwhelmingly the literature reviewed was from the United States of America (28%) followed by the United Kingdom (26%) and Australia (22%) and some 70% was written for a practitioner, rather than scholarly audience.
- By number, most of the literature addresses the case for a linkage in theoretical terms or through the medium of attitudinal studies. Very few empirical studies were available to review and most major empirical work is US based. There are no major UK empirical studies.
- Some of the literature, particularly that emanating from the US, refers to 'green' buildings; other authors, notably from the UK and Australia use the term 'sustainable' buildings; yet

others used the terms inter-changeably. To many authors whichever term was used, the issue was restricted primarily to environmental concerns and, within this, energy. Others recognise a fuller range of social and environmental considerations. In the light of the definitional issue, which is widely acknowledged in the literature, later studies tend to use building rating systems such as LEED and BREEAM as surrogates for a sustainable buildings definition.

- The literature predominantly related to office buildings, which was to be expected as this sector has the most sustainability-rated buildings. However, retail and leisure, which arguably make the highest energy demands, together accounted for only 9% of articles reviewed. Industrial buildings studies accounted for a mere 1%.

Overall Conclusions

- The search for a link exists between the sustainability credentials of a building and its rental or/and capital value began some ten years ago, but is still in its infancy. Early attempts at a business case were founded on low additional cost, lower risk and reputational benefit. There was also a strong view that cost savings in the hands of the tenant would result in rental differentiation, leading in turn to a reduction of long-term risk and better 'future-proofing' of investments. The argument also turns on their ability to support investors' and occupiers' CSR policies.
- The review pointed to many surveys having been undertaken which give credence to the view that that sustainable buildings are worth more. However, the nature of *intention* is that it is just that – intention not actuality.
- Over the last two years data has begun to emerge in the form of a handful of large-scale studies based on the US office market. The evidence is acknowledged still to be tenuous and generally goes no further than to point to a connection between higher rents achieved for LEED and Energy Star accredited buildings compared with similar non-accredited buildings. There is no substantive evidence that points to any firm connection with increased capital values achieved on sale.
- Currently further empirical studies are hampered by the lack of agreement as to what constitutes a sustainable building and the lack of a simple benchmark that remains static over time. Moves towards a universal definition are beginning to be manifested and as these

start to filter down to the market, and as the work of organisations such as IPD begin to provide data on sustainable buildings, so a finer basis for analysis will emerge.

- For now the value and sustainability link is argued strongly in theory and in opinion, but in terms of hard evidence it is very limited and restricted to rental differentiation within a tight geographical area and within one sub-sector of the market.

Recommendations

- Data relating to building certification, such as BREEAM should be made more accessible to the public, thus enabling better tracking and evaluation of financial performance.
- The property industry should work towards the successful development of a meaningful index of sustainable property performance, and should support the development of an internationally aligned and accepted rating system for buildings.
- Further work should be undertaken to arrive at an industry-wide definition of sustainable buildings which can form the framework for benchmarking individual buildings assessments and thus support valuers by providing information which they can incorporate in the preparation of valuations.
- Further research should be undertaken to develop a deeper understanding of what sustainability features really matter to tenants and building occupiers.
- In recognition of the pivotal role that property professionals play in interpreting markets, professional education at both pre- and post-qualification stages should incorporate a focus on sustainability. CPD providers and the professional and representative bodies have a key role to play in achieving this.

1 INTRODUCTION

Sustainability is not a new concern and modern literature traces back to seminal works both of science, such as Carson's *Silent Spring* (1962) and economics, such as Schumacher's *Small is Beautiful* (1973), both of which challenged conventional wisdoms. However, the mainstreaming of 'sustainability' as a triple headed concept seeking a balance between economic growth, social well-being and environmental protection dates back some twenty years to the publication of the Brundtland report *Our Common Future* (1987). The response of governments within many mature economies is now clearly traceable through a range of legislative measures at both supra-national, national and local levels. Within the UK, for example, government has sought to implement the principles behind sustainability through planning legislation and building regulations as well as social legislation. However, although sustainability as a concept includes both economic prosperity and social justice, much of the literature and indeed government and intra-governmental responses have focused on environmental protection and in particular issues surrounding energy and, more recently, carbon. It has only been very recently, notably with the publication of the Stern Review *The Economics of Climate Change* (2006) that a strong link has been proposed between environmental measures and economic wellbeing.

One corporate response has been the rapid growth in corporate social responsibility (CSR) and within a ten year period the publication of environmental and social reports has become commonplace with public companies seeking to position themselves as responsible and responsive to environmental and social concerns. Theoretically, such positioning by corporations and governments should translate through market mechanisms into increased demand for, and hence premium value of, sustainable property.

As shown by Sayce *et al.* (2007), the property and construction industry has been repeatedly criticised for being slow to respond to the increased focus on sustainability within a wider business context. The so-called Circle of Blame (Sustainable Construction Task Group, 2001) illustrated the obstacles to a widespread adoption of sustainability principles within the built environment. Bennett (2006) suggests that a limited understanding of the benefits of sustainable buildings has been a key inhibitor, as has the perception that whilst it costs more to build or fit out buildings to a sustainable standard there is little to be gained financially to warrant the extra expense. Recent evidence however, suggests that this perception is unwarranted (McAllister *et al.* 2009) and a better understanding of the opportunities that sustainable property has to offer is now being explored by a growing number of participants from both the owner and occupier groups (All Party Urban Development Group, 2008). Committed parties have embarked on the development of buildings

which display a range of environmental features and the incidence of use of accreditation systems, such as LEED, BREEAM and Energy Star has become more prevalent. There are now over 1,000 BREEAM rated commercial buildings in the UK; Green Star, the Australian rating system, boasts around 150 certified properties and LEED, which is mainly used in the US with some adoption also in the UK, now covers 1.062 billion square feet of developed floorspace in more than 1,800 buildings.

Property advisors are responding to clients' increased interest in, and concern for, how sustainability will impact business performance in the future. A cross-disciplinary focus on sustainability within consultancies is evident within the major real estate consultancy, and collectively, a considerable effort is being made by these firms to track and raise awareness of sustainability amongst key players including investors and occupiers, developers and public authorities. (see for example, Cushman and Wakefield, 2009; Jones Lang LaSalle, 2008b)

Within the investment sector, commentators have sought to make the claim that investing in accredited or sustainable stock either does, or may, yield higher returns and other benefits (Jones Lang LaSalle, 2008b; Eichholtz *et al.*, 2009); others have claimed benefits to owner-occupiers and tenants based on a range of revenue saving and welfare benefit arguments (Eichholtz *et al.* 2008).

Among UK property investors, the moves to 'green portfolios' have started with, for example PruPim's setting up of an 'improver' fund (Mistra, 2008) and the introduction by some investors of 'green' leases (Hinnells *et al.* 2008). These measures reflect the expectation that, moving forward, sustainability issues may underpin business and investment performance. This in turn suggests that, at least in theory, there is demand in the marketplace for sustainable property. Theoretical links have been postulated by a number of studies for example, Ellison and Sayce (2006); Lorenz and Lutzkendorf (2008); Bienert *et al.* (2008). However these studies and the actual actions of investors do not answer the question: has the link between sustainability features in property and value been established?

2 AIM

The overall aim of the work has been to investigate the extent to which, if at all, the literature supports the contention that there is an observable link between prices achieved in the marketplace and the sustainability credentials of commercial properties. By so doing, the aim is to both inform practice as to the strength of the current evidence base, as revealed through literature, and to provide an indication of the future 'direction of travel' in respect of sustainability and value.

Fundamental to establishing any link is the need to understand what is meant by the term 'sustainable property'. If no common understanding can be demonstrated, then links become, at best, tenuous, but, realistically, unproven. Within the literature reviewed below, a theme that is addressed is the understanding of sustainable property and the interaction of this term with the legislative and regulatory frameworks which over time are placing stricter requirements on those who construct, own and occupy property. A fundamental assumption that is reviewed through the literature is the expectation that sustainable property will perform beyond the baseline of compliance and that it will offer considerable benefits over and above conventional or merely compliant property; also that it has the potential to improve both business and investment performance. Whilst the need to address sustainability issues on a property level is primarily founded on links between the performance of buildings with regard to energy efficiency and CO₂ emissions, other factors such as social impact and the well-being of users have begun to be better understood and are referred to within the review.

The review is, however, primarily concerned with establishing the extent to which any linkage, however well argued in theoretical terms, has begun to be evidenced within prices achieved in the market; for this, rigorous studies are required. Prices are the result of many different factors and are frequently only decided upon on the advice of professionals. Therefore, unless and until property professionals in providing professional advice to potential purchasers take account of sustainability within their appraisals, it is unlikely to be evidenced within prices actually achieved. Within the review, therefore, it was considered relevant to reflect on the advice and education of valuers in respect of sustainability issues.

3 METHODOLOGY

This report is based on the findings of a comprehensive search for, and review of, publications relating primarily to or pertaining to the relationship between sustainability and real estate values. A wide range of literature has been considered including the results of commissioned academic peer-reviewed journal articles, selected professional press reports, research reports of real estate consultants, and conference papers.

The sample was limited to publications in English but the search was carried out on a global scale and represents publications from across the world. In terms of the scope of the literature, articles primarily concerned with the growing Responsible Property Investment (RPI) movement were for the main part excluded as, although the criteria of investors is germane to the nature of demand for real estate, the primary focus on most of these articles is on emergent investor behaviour, not observed pricing in the marketplace. An exception has been made in some cases, where an article has been widely cited, for example Pivo and McNamara (2005) as this provides a context to some recent developments within the literature on pricing.

The date of the literature is also relevant. Essentially, only literature published since 2000 has been included. Some publications prior to that date have been analysed but for the most part, these did not expressly consider such a relationship and it was considered that the markets and the understanding of sustainability within the valuation community at such a time were insufficiently developed to make inclusion of such material meaningful. Literature up to and including June 2009 has been included.

The literature was collected through online searches and worldwide direct targeting of members of the academic and professional communities in order better to ensure coverage. In total, out of a very significant number of articles collected, some 128 have been chosen for further consideration and analysis. A full list of these articles is contained within the referencing and further literature at the end of the report. Alongside this, the research team selected a number of articles from the sample which readers of the report may find of particular use as a background to the subject. These articles are summarised in the accompanying annotated bibliography.

In selecting the articles for inclusion within the analysis, many articles had to be discarded as they were essentially commentaries of empirical studies and their inclusion could distort the results. Instead the preference has been to rely primarily on the original research articles. The review has, as indicated above, also excluded with a few exceptions the fast growing and extensive literature related to the Responsible Property Investment (RPI) and to the wider environmental valuation

theories, such as contingent valuation and cost benefit analysis, for which there is a long established literature, mainly related to public sector development schemes.

The literature was analysed against a set of criteria, enabling conclusions to be made in regards to:

- National focus of the issues;
- Type of research;
- Property sector examined;
- Definition of sustainability as applied to property, including consideration for accreditation through standards such as BREEAM and LEED;
- The potential value impacts in terms of rent, yields and risk profiles; and
- The potential beneficiaries of any 'green elements'.

By analysing the results against specific criteria it has been possible to develop quantitative findings, including simple statistical data and cross-tabulations. However, once commentary articles had been excluded, the sample size became too small and disparate to enable more sophisticated techniques such as meta-analysis to be meaningfully applied.

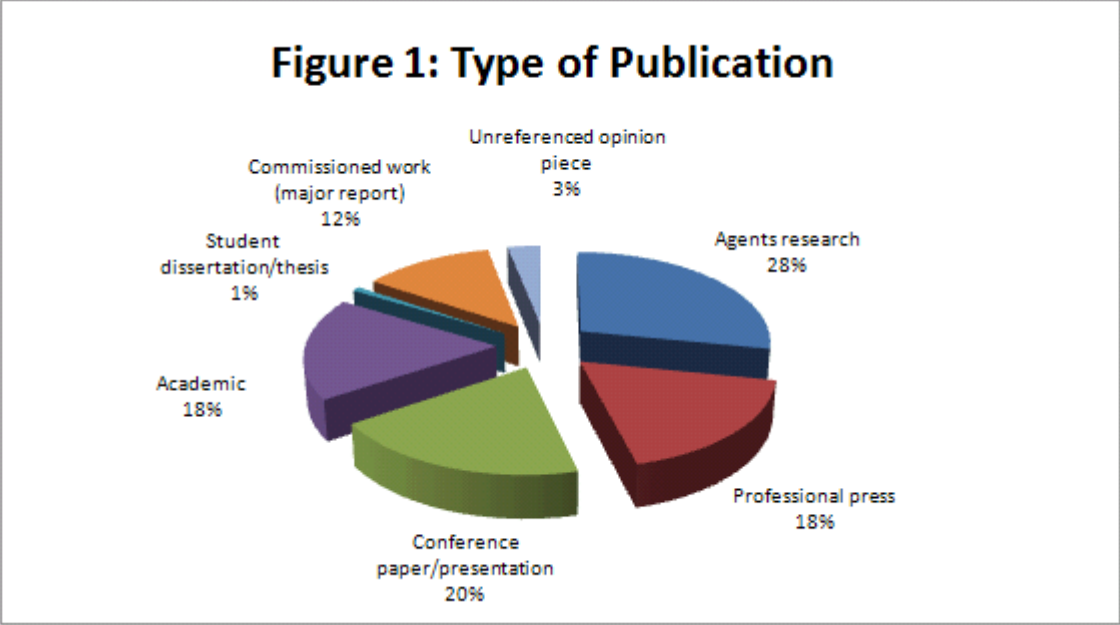
4 FINDINGS RELATED TO THE SAMPLE

4.1 Nature of the literature

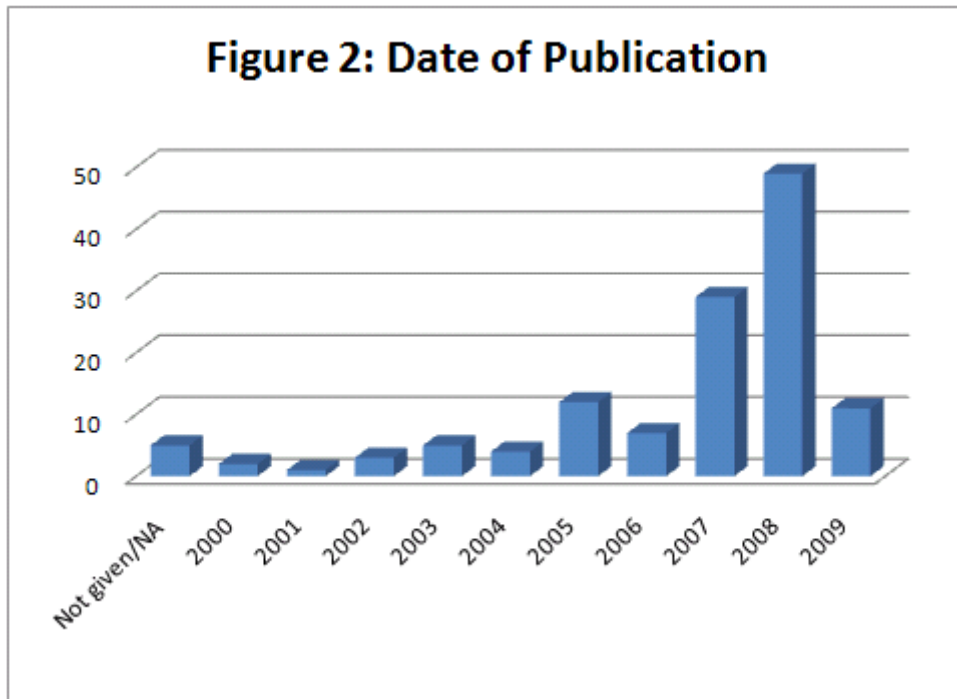
The predominant types of literature within the sample base are agents' publications and conference papers, followed by the professional press and academic work published in peer reviewed journals. Commissioned work, supported mainly by industry, also represents a substantial proportion of the sample (see Figure 1 below). There was little evidence of work supported by research council grants or by government. RICS have been an important contributor to the literature notably by supporting two of the largest and most comprehensive studies (RICS, 2005; Eichholtz *et al*, 2009). This could indicate that the matter has, until now, been of importance to those operating within the property market, rather than being recognised as being part of the wider drive to change behaviour in response to the sustainability debate and, in particular, climate change, despite buildings being a major source of carbon emissions.

Of the academic literature published there are many more conference papers than refereed journal articles. This again points to the subject being emergent as the lead time for publication in high quality journals can be protracted and many research projects are exposed to dissemination by way of conference papers before they appear in journals. Again, in examining the literature, care had to be taken not to double-count. Where research has been published in a journal, analysis of preceding conference papers has been excluded, except where they differ significantly.

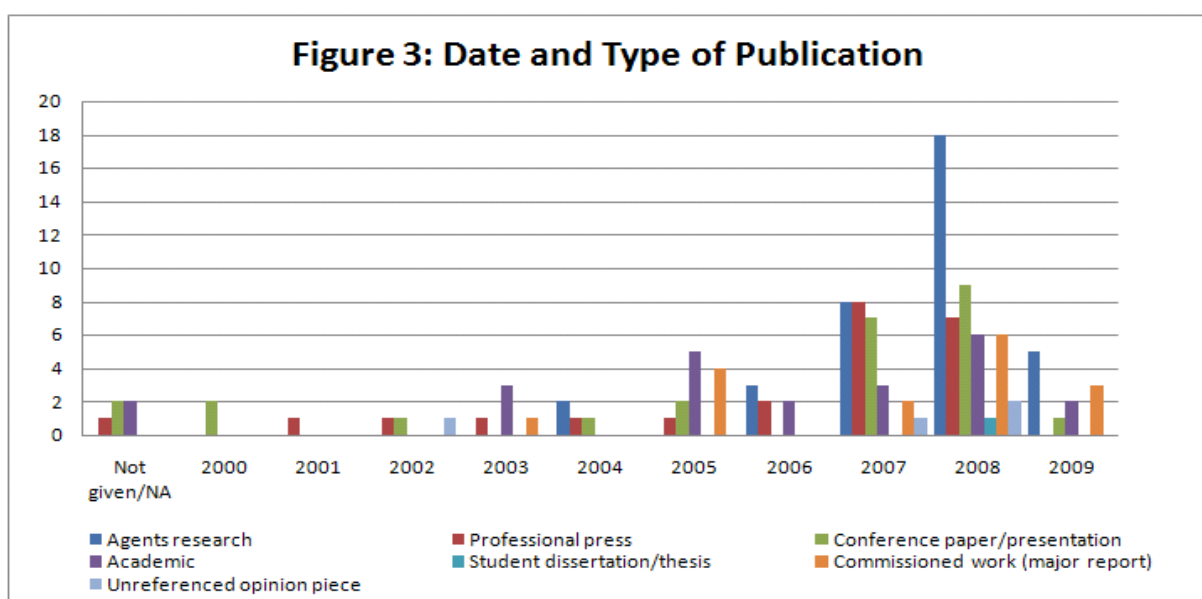
In terms of professional press, sustainability and its impact on markets features frequently, and reflects the popular interest in the subject. Frequently, such publications are either commentary on work which has been included elsewhere, or based on anecdotal evidence. For this reason, articles contained within the weekly property press both in UK and elsewhere have been excluded unless there was good reason to include them.



In line with the growing awareness of sustainability matters, there is an expectation that the literature seeking to place a value argument in relation to sustainability would reveal an increase over the period of study and this proved to be the case as demonstrated in Figure 2 below. It was not until 2005 that any significant level of publications in the field of value and sustainability emerged. This contrasts with the situation related to the need to produce ‘green buildings’ (i.e. the supply side) where the literature on technology for green buildings dates back to the mid 1990s, if not earlier. (see for example, Farmer and Richardson, 1996; Edwards (1999)) .

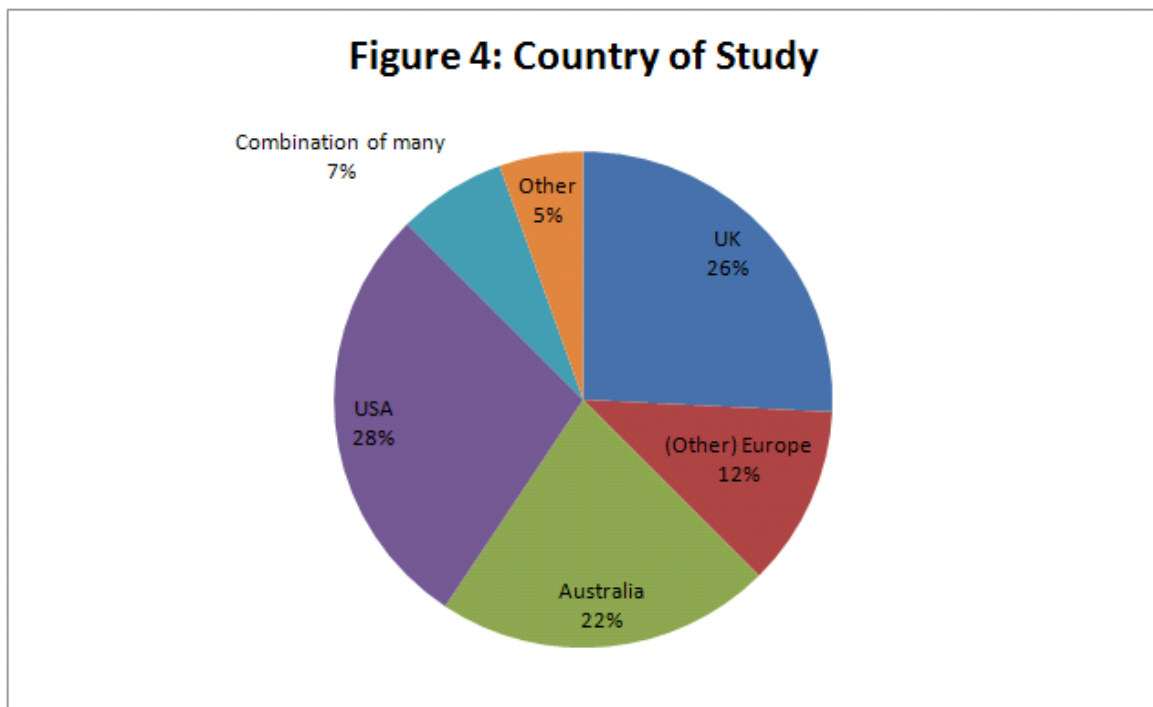


If the type and date of publication are combined (see Figure 3 below), what emerges is a picture in which it can be seen that the professional press started to pick up on issues earlier, but the publication of peer reviewed Journal articles has followed later. The earliest of such papers, St Lawrence (2004), only dealt with value as a peripheral issue, and other papers published prior to 2007 (for example Reed and Wilkinson, 2005) have concentrated primarily on a rationale for a link. Indeed, it has only been within the last year that papers have begun to test any links empirically (see for example Fuerst and McAllister, 2008). Among conference papers the links began to be explored at an earlier date (see for example Sayce, Ellison and Smith, 2004; Eichholtz *et al*, 2008).



In terms of place of publication, it is acknowledged that the sample is potentially skewed as only publications in English were considered. Nonetheless, as demonstrated in Figure 4 below, it is clear that the most interest in the relationship has been generated by papers appearing in US, UK and Australia. Of the articles studied in total only some 24% did not emanate from these three regions. It will be noted that some studies related to more than one country and there was little literature emerging from Europe that is published in English. The pre-eminent exception to this is the work of Lorenz and Lutzkendorf (2005; 2008 [a];[b];[c]); their work is primarily concerned with theoretical modelling and intended for cross-country application.

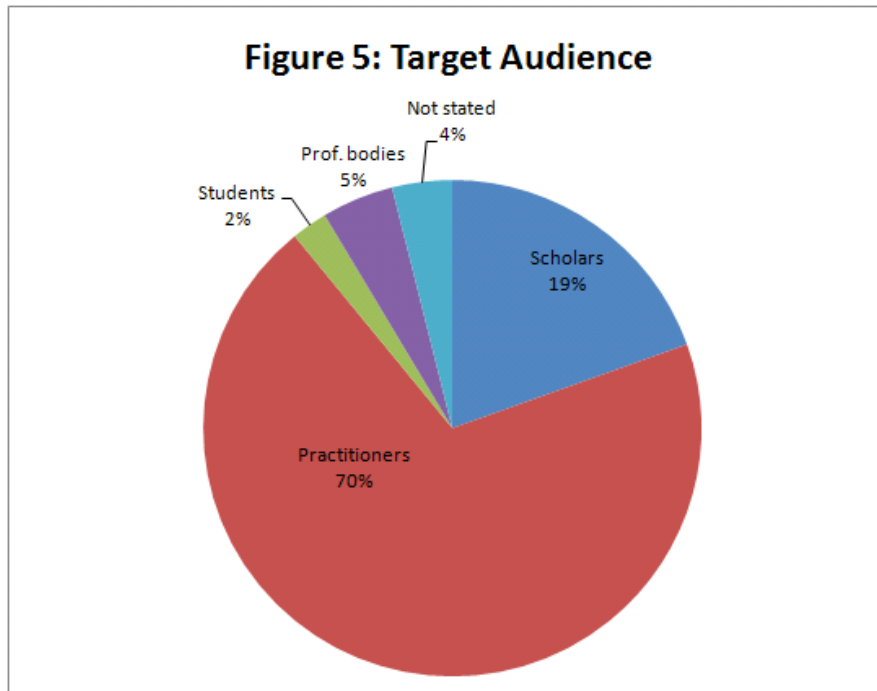
The concentration of literature within the US/UK/Australian titles is perhaps not surprising given that they have large, sophisticated, comparatively transparent and mature property investment markets which therefore provide researchers and commentators with access to data and market participants. The leading role in terms of number of publications of studies from the US is worthy of note given the then reluctance of their government to engage with some aspects of the sustainability debate, notably with climate change, as evidenced by their refusal to sign the Kyoto protocol.



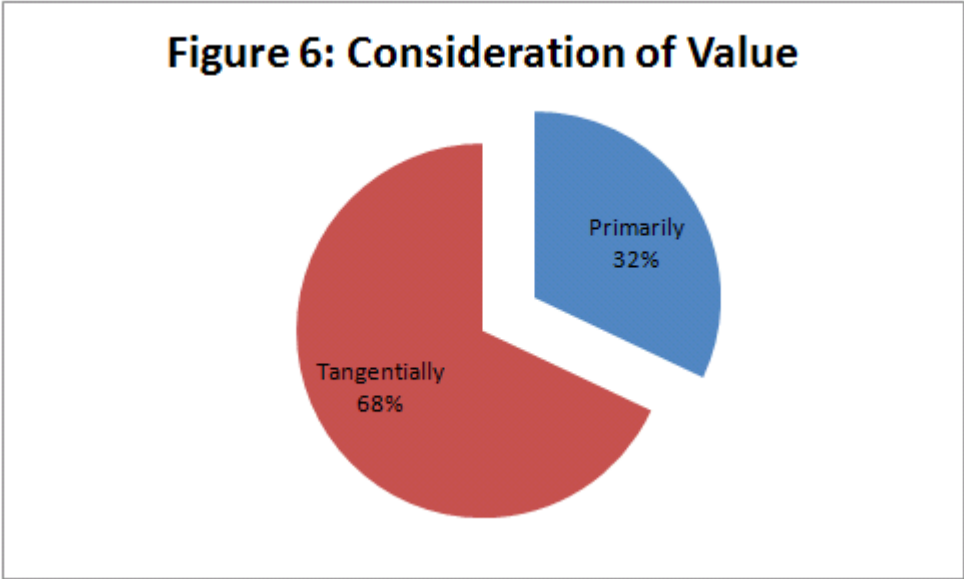
The literature was also analysed by the primary audience for whom it was intended. If sustainability factors are to be linked to value, this will be as a result of knowledge and understanding of the actual and potential impacts being translated to purchase/sale decisions. Whilst most articles did not

specifically indicate the intended readership, the research team made a judgement based on both the nature of the publication and its readership together with any indications within the text.

The results show that the majority of articles (some 62%), either explicitly or through their aims and recommendations, were intended to be of use to practitioners. It was perhaps surprising that more did not specifically address professional bodies, given the key role that they have in helping to form opinion and lead the acquisition of knowledge by their members.

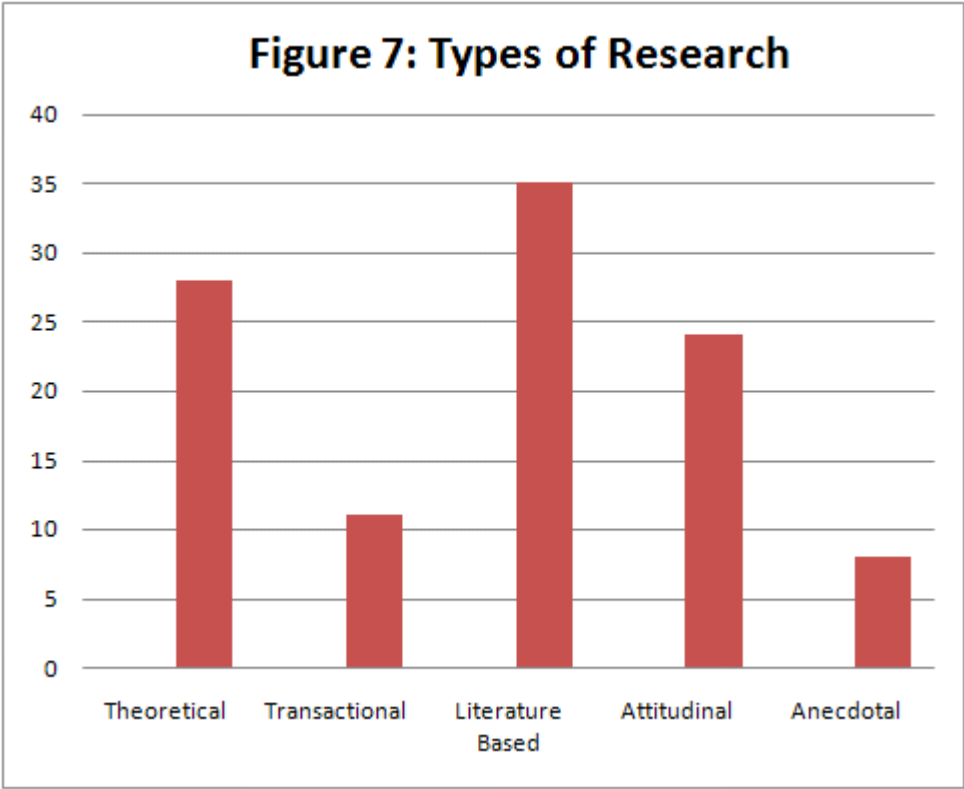


The primary aim of the review was to assess the extent to which the literature had examined any link between observable market prices and sustainability features. However, of the articles reviewed, only about a third (32%) had value as a key consideration within the publication, and even fewer were solely related to the issue. Therefore, in conducting the analysis, the research team sought to analyse articles which related to value in some way but in which the link was more tenuous. In the majority of articles, the key considerations related to a range of issues, notably costs of development and the establishment of a wider business case. In terms of the latter, given that it is as long ago as 2001 that the then Sustainable Construction Task Group published the results of a study to establish a business case (Sustainable Construction Task Group, 2001) it is perhaps disappointing that many articles have not taken the argument forward significantly.



4.2 Type of Evidence

It is considered important to consider the extent to which data included in the literature is based on empirical evidence, on perception or on opinion and between arguments cases made on the basis of the theoretical business case. Whilst all forms of evidence can provide useful guidance, intention surveys do not provide real evidence of value – even though in the field of environmental valuation they sometimes have to be adopted in the absence of hard data. In the case of this literature, very little transactional data was found (see Figure 7 below).



4.2.1 Summary Relating to the Nature of the Literature

The analysis above points to the relationship between value and sustainability being a very new and under-researched subject. It is only within the last two years that papers in the academic literature have begun to address the issue. Overall awareness however, has been high, as evidenced by the numbers of articles published in professional journals, particularly in the more sophisticated markets, although it was noted that there was a low number of articles from Canada.

4.3 An Understanding of Sustainable Buildings

Fundamental to any analysis of a link between sustainability and value is the need to establish a clear understanding of what constitutes a 'sustainable' building. If authors use the term 'sustainable' in many different ways then analysis becomes, at best, extremely complex and at worst, meaningless. The research team therefore sought to establish whether it was possible to discern a common consensus from the literature, acknowledging that this would be likely to have changed over time.

The term 'sustainable' has many connotations and can be regarded as contested territory. Within mainstream literature and government publications it mainly derives from the Brundtland definitions (Brundtland, 1987), which relates to development or to the concept of triple bottom line (TBL) sustainability following from Elkington's work (Elkington, 1997). All widely used business and government interpretations now recognise that sustainability is not just a matter of environmental protectionism; it requires a balance between the need to conserve the natural environment with the requirements for a just society and economic survival, if not growth. Whilst the issue of climate change and the increasing acceptance of man's role in exacerbating such change has been the matter of much debate, and indeed policy and legislation, it is certainly not the only aspect that matters.

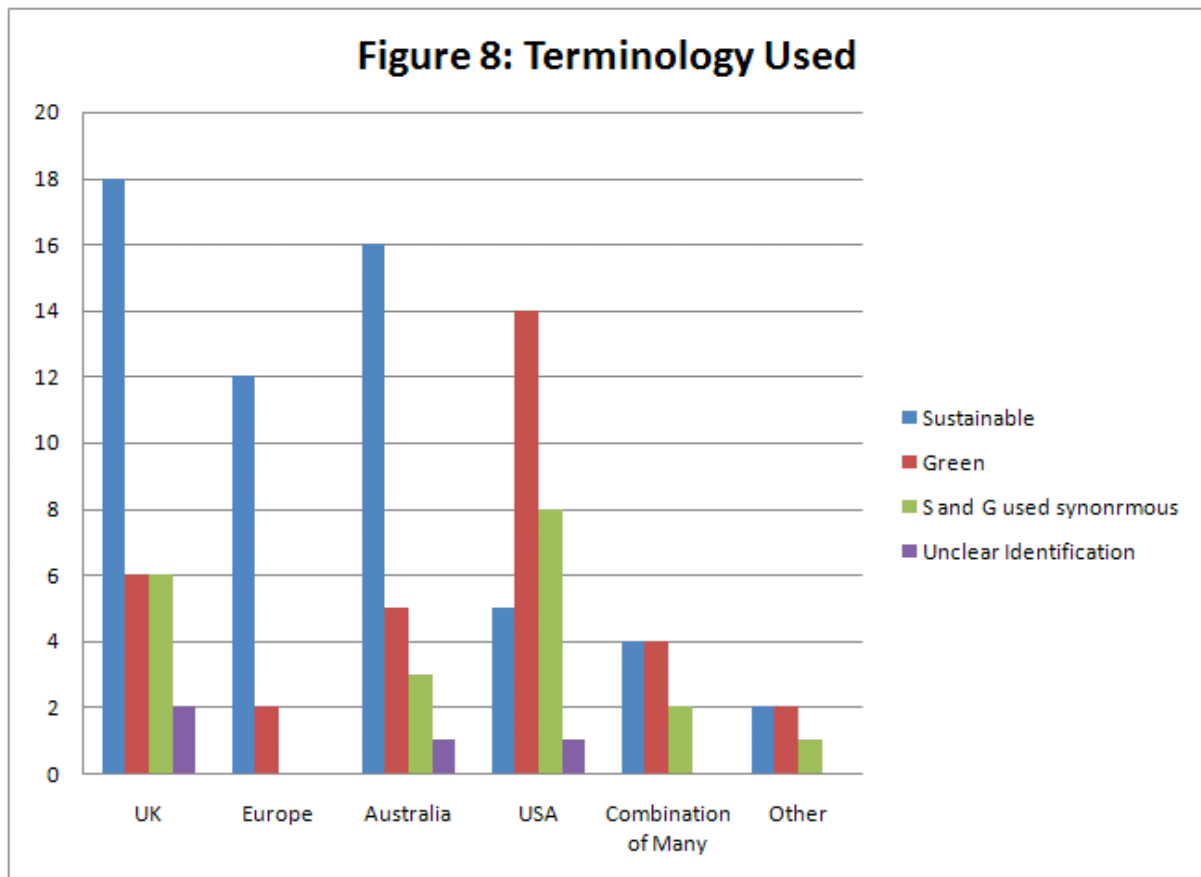
Inevitably, as buildings are a major source of carbon emissions, legislation relating to building standards has a focus on measures to reduce emissions. However, any interpretation of a sustainable building as being one that was so regarded in relation only to its emission rating or energy use would be inaccurate. Sustainability within buildings is associated with a range of characteristics, which can be linked to criteria considering its environmental, social and economic performance. This is articulated most clearly in the current UK Green Building Council definition (UKGBC, 2009, p.5);

‘A sustainable building should be one which meets peoples’ needs – as a home, or a workplace for example – in ways which enhance its positive impacts and minimize its negative impacts, environmentally and socially, both locally and globally over time.’

However, in its report *Making the case for a Code for Sustainable Buildings*, the UKGBC recognises that *‘to make sense in business case terms, the [future] definition of a sustainable building must be based on standard qualitative measures supported by empirical evidence.’* (UKGBC, 2009, p.5)

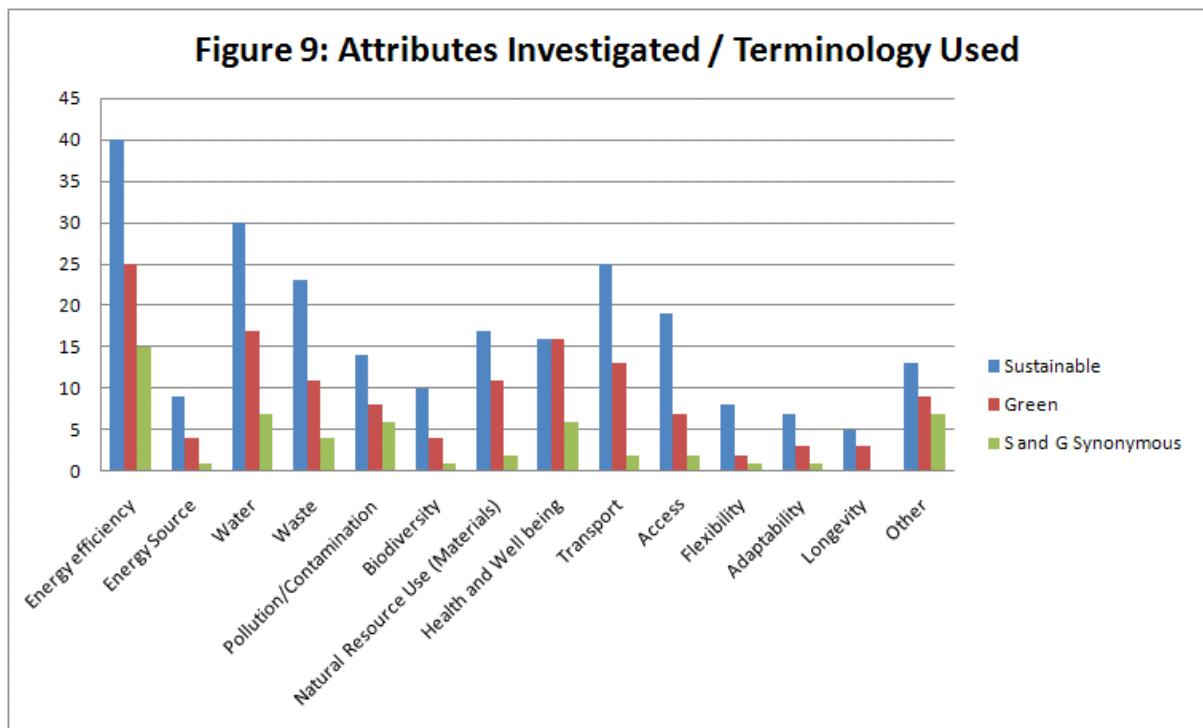
The added complication to the definitional debate is that some authors refer to buildings as ‘green’ rather than ‘sustainable’ and in the analysis no single definition emerged. The literature analysed referred to either sustainable buildings or green buildings and sometimes the two terms are used synonymously within the same paper. In many instances, the term ‘green’ or ‘sustainable’ was used without any real attempt at definition; it was inferred that the reader would be able to understand what was meant.

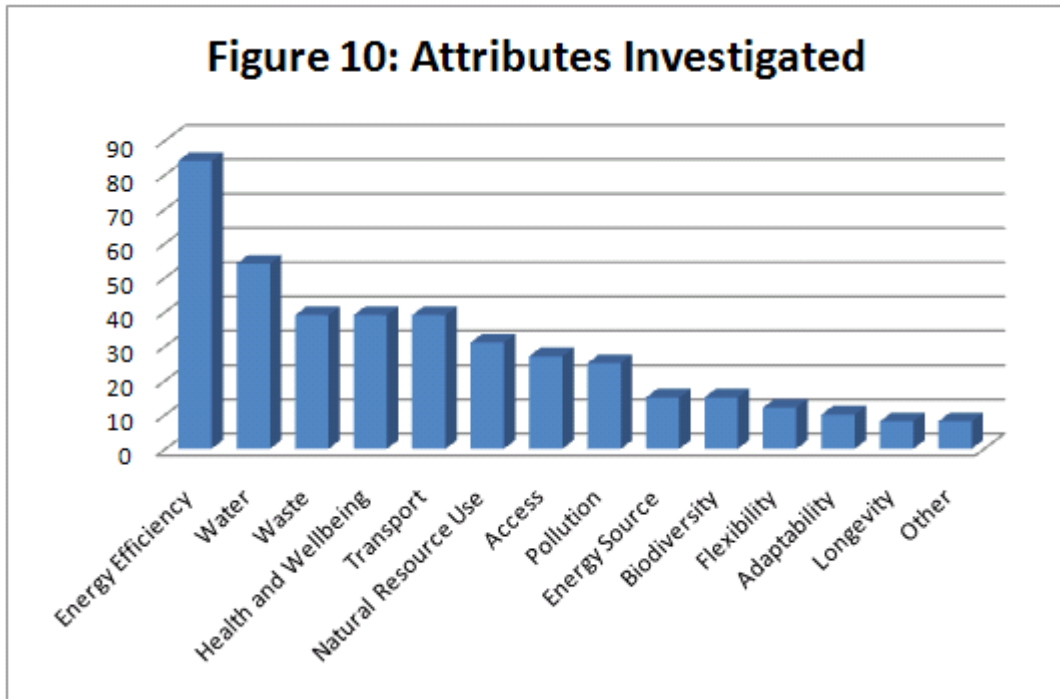
Overall, however, as can be seen in Figure 8 below there is a tendency for ‘sustainable’ to be the dominant term in UK and Australian literature and for ‘green’ to be used within US publications.



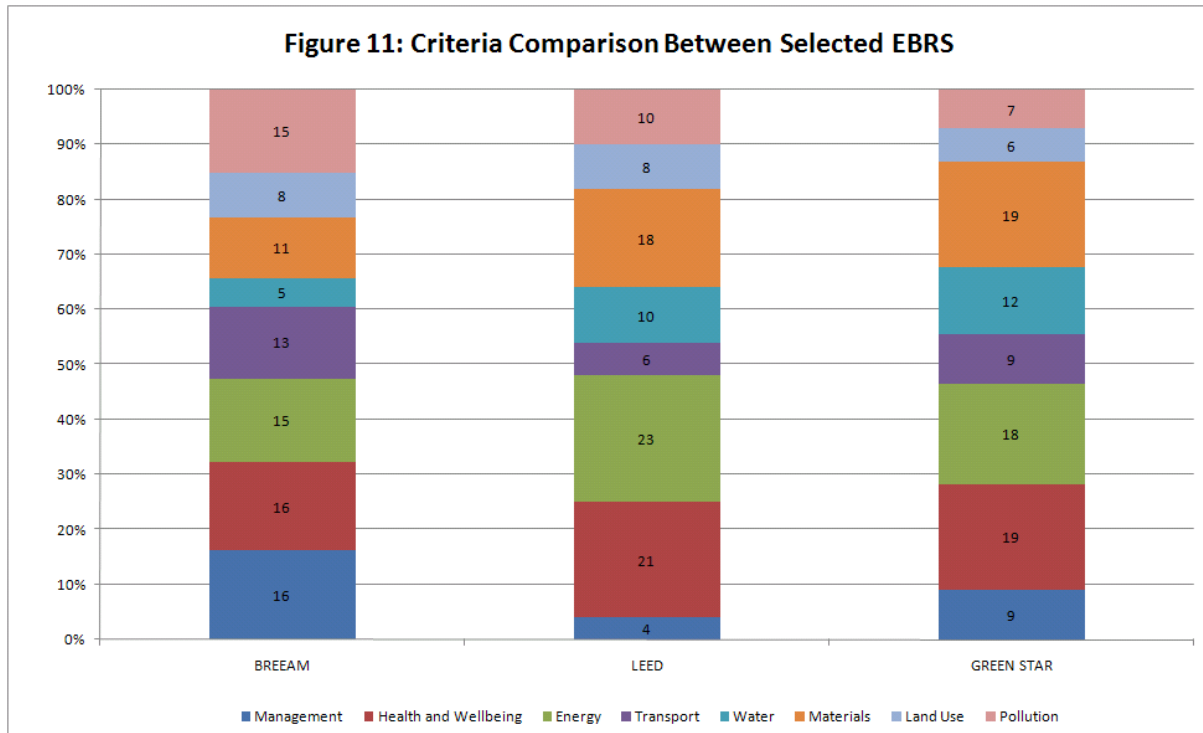
For the purposes of the research, of greater importance than the definitional ‘label’ given to the building was the range of characteristics that lie behind the term used. Warren-Myers and Reed (2009) discuss that the issue is not so much definitional, but how these buildings are represented in the market and how you identify how sustainable it is. Figures 9 and 10 demonstrate that, to many authors, energy efficiency is the key attribute associated with both sustainable and green buildings – with water and health and well-being also being attributes commonly included. Whilst it is evident from this analysis that there is in reality little differentiation between what is meant in the literature between the two terms, authors using the term sustainable are more likely to have considered a wider range of factors, including those less easily defined qualities of building adaptability, flexibility and longevity.

Whilst the issue of energy efficiency has been part of the vocabulary of governments for some years, the issue of energy *sourcing* is more recent but potentially more important. As technologies have improved and recognition grown that there is a need to explore renewable energy sources, so it would be expected that the source of energy would become an important consideration in terms of what constitutes a sustainable building. However, the literature shows that this is far from the case, and the issue of energy sources was mentioned in very few publications.





Some of the studies (for example Miller *et al*, 2008; Fuerst and McAllister, 2008; Bowman and Wills, 2008; Eichholtz *et al*, 2009) link the sustainability or greenness of a building to a rating system such as Energy Star, LEED and BREEAM. LEED (Leadership in Energy and Environmental Design) is the dominant system used in the US, which considers a wider range of attributes than the name implies. It is used alongside Energy Star which relates solely to energy use and has a much larger database of buildings. Within the UK, BREEAM (Building Research Establishment Environmental Assessment Method) is the leading standard, whilst in Australia Green Star is the equivalent label. However, each of these systems has its own set of criteria against which buildings are rated. Figure 11 shows the different composition of the rating systems with a more detailed table of comparison in **Appendix A**. As can be seen in Figure 11, whilst the BREEAM system shows a greater focus on criteria relating to the management of buildings, LEED and Green Star show a more significant weighting towards energy and wellbeing considerations.



All these standards are voluntary, and cost the owner or developer to acquire, and therefore it is likely that some buildings which would perform well against some or all of the criteria exist but are not captured by reference to a system of accreditation. These systems are also graded (for example, BREEAM Good, Very Good, Excellent and, most recently, Outstanding) and subject to review of standards over time. So, for example, a building that acquired the label of ‘Excellent’ under the 2006 BREEAM rating would not necessarily achieve that rating under the updated 2008 standards. Furthermore, all the major rating systems have indefinite life yet they incorporate matters connected with building management and performance. These can and do change over time. Accordingly, whilst a rating may be relevant at the time of issue, it is not a measure that necessarily implies continuance of excellence.

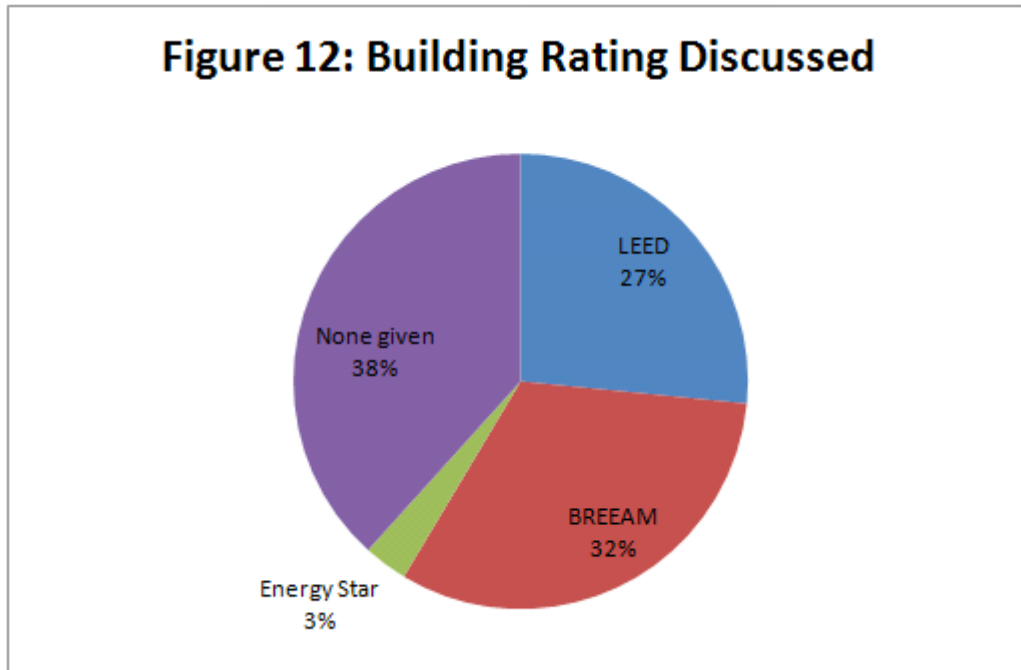
Given that buildings do not transact frequently this is a challenge in terms of using such measures as surrogates for sustainability. The other major difficulty in interpreting findings linked to building rating systems lies in the lack of transparency of buildings’ performance in relation to each criterion considered which is not individually reflected in the overall rating. Therefore it would be extremely difficult to pull out any one feature and say it contributes more than another to value, unless some form of large scale hedonic pricing exercise were to be undertaken.

Notwithstanding these constraints, the major accreditation schemes provide the easiest and most natural surrogates for sustainable buildings, albeit that their agendas tend to be focused on environmental issues and they are difficult to compare internationally. In response to demand

BREEAM has launched geographical schemes such as BREEAM Europe which has received significant backing from European developers (Shahmanesh-Banks, 2008) and an international rating system which is adaptable to local conditions as diverse as Mauritius and the United Arab Emirates. A move towards an internationally consistent and comparable system of measuring the environmental impact of buildings has gathered pace with BREEAM, LEED and Green Star signing a Memorandum of Understanding primarily aimed at mapping and developing common metrics to measure energy use and carbon emissions from buildings. In addition to this, BRE Global, Centre Scientifique et Technique du Bâtiment (CSTB) and CERTIVEA (equivalent French system) signed a Memorandum of Understanding in June 2009, with the ultimate aim of developing a single, Pan-European rating system (BREEAM, 2009). As and when these programmes develop, international comparability should improve with studies using such systems becoming more universally indicative.

It is perhaps for this reason that the large-scale empirical studies have concentrated on comparing the value performance between certified and non-certified buildings. Even many non-empirical studies use rating systems to establish a working understanding of sustainable buildings (see Figure 12). Most authors recognise the shortcomings of the method in that they have not differentiated between grades of certification and there has been little explicit recognition that the ratings may not be the same date for every building in the study. The studies have also not been able to take account of the fact that some non-certified buildings may display sustainability characteristics which are equal, or indeed superior, to those that do bear the label. The possibility of this is accepted by some authors, but others have taken a very simplistic approach in producing comparisons. The Australian-based survey by Warren-Myers and Reed (2009) found that a very large majority of valuers (82%) would use an industry rating tool to determine sustainability within a building. This study highlights the importance of the ability to use such a system as a reference point and in addition indicates the need to place information of this nature in the public domain.

Figure 12: Building Rating Discussed



4.3.1 Summary in Relation to an Understanding of Sustainable Buildings

Definitional issues remain a clear and significant barrier to establishing a link between value and sustainability. The analysis considered both the use of labelling of buildings within the literature and the range of characteristics that lie behind the respective labels. Whilst geographical differences exist between the terms used to connote sustainability, it was found that there is little differentiation between what is implied by the labels green and sustainable in terms of buildings, although authors using the term sustainable are more likely to have considered a wider range of factors. The attributes of major importance are, as would be expected, those attributes concerned with minimising the environmental impact, most significantly energy, waste and water consumption and subsequently offering tangible savings to occupiers which help in supporting the business case for both landlords and occupiers. In addition to these, the health and wellbeing of occupiers were widely discussed within the literature, acknowledging the social aspect of sustainability.

On the basis that where authors have used a certification as a framework, such as the recent empirical studies carried out by Miller *et al.* (2008), Fuerst and McAllister (2008) and Eichholtz *et al.* (2009) a positive value differentiation between certified buildings and non-certified buildings has been found. It is noted that all these studies were of office buildings. This suggests that there is a demonstrable value in obtaining a recognised certification of a building as argued by Warren-Myers (2009). However what has not been established is the link between additional value and any *individual* sustainability attributes of the sample buildings. The possible exception to this is work related to the Energy Star label as this label is concerned only with energy performance. More research is needed in this area.

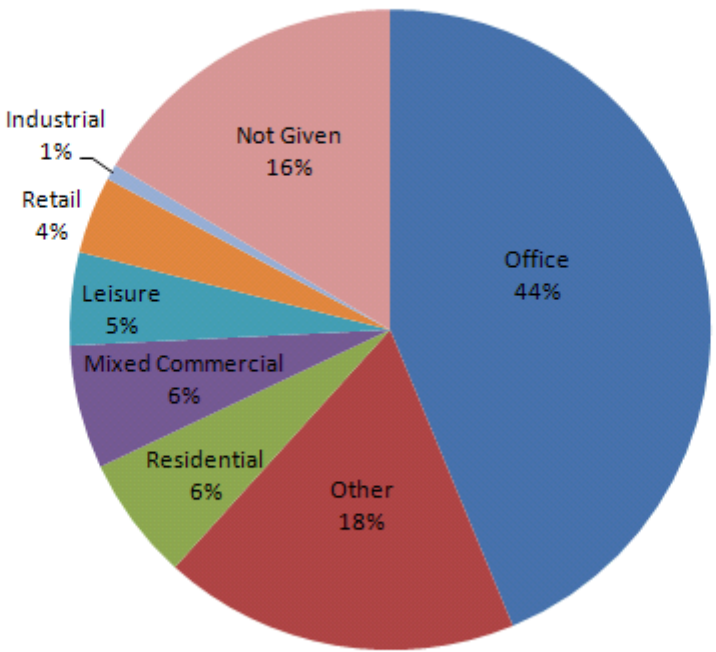
4.4 Property Sectors

The analysis makes it evident that office buildings are the sector that is the primary subject of research examining potential links between sustainability and value. Given that more accreditation certificates have been given for offices than for other types of commercial property and that they form a large element of many investment portfolios, this result is not unexpected. Also, offices tend to be let on shorter-term leases than retail and other commercial assets, which means that the impact of tenant requirements is likely to be felt more quickly by office investment landlords who therefore need to be very sensitive to tenant requirements. What is perhaps unanticipated is the lack of literature relating to retail and leisure sectors given that, for these properties, energy consumption can often be extremely high and that for retail centres matters such as waste management are very important, with many new centres now seeking to design in on-site compaction plants. Additionally, there is a lack of research into the industrial sector, despite significant innovations into sustainable distribution warehouses. This is most likely to be attributable to the initially low rental value and lack of information for such properties. If the industry is to fully understand the effect of sustainability on property value, further research is required to develop an understanding of the impacts of various sustainability criteria in other sectors, retail in particular.

This review was concerned with commercial property; however within the sample of literature there were references made to residential property but, except where they made points potentially transferable to commercial property, these have been excluded.

Within the analysis is a categorisation of 'other'. This was used for articles in which no property sector was specified; the majority of these were theoretical or opinion pieces making a case for sustainable property to be more 'valuable' on a variety of grounds, as explored below.

Figure 13: Property Sector



5 LINKING SUSTAINABILITY TO VALUE: WHAT IS THE REAL EVIDENCE?

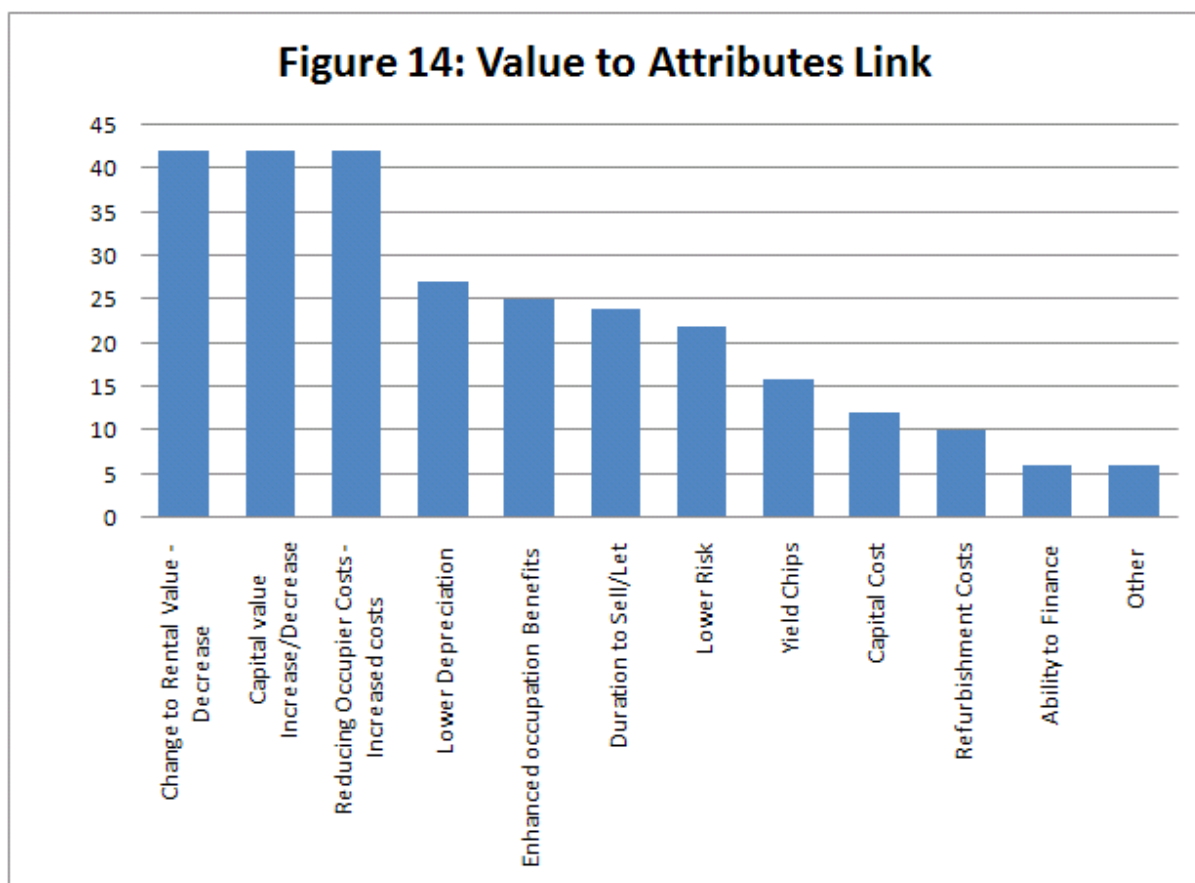
5.1 Introduction

Value is a word which can have many meanings and within the literature it was found that it was used in a variety of ways. Warren-Myers and Reed (2009) particularly recognise that *'significant amount of research into the value of sustainability is causing substantial confusion in the market by using varying concepts of value interchangeably in an endeavour to make sustainability seem more viable.'* Within the valuation community world-wide there is general agreement as to the definition of 'value in exchange' with most organisations adopting the definition found within the International Valuation Standards (IVSC, 2007) and followed by members of RICS internationally as follows:

'The estimated amount for which a property should exchange on the date of valuation between a willing buyer and a willing seller in an arm's-length transaction after proper marketing wherein the parties had each acted knowledgeably, prudently and without compulsion.'

However, market value is only one definition and value in its wider sense can reflect a number of characteristics which can be said to provide value, monetary or psychological, to people. In a perfect market, price in exchange will reflect all these characteristics accurately. However, the property market is seldom perfect and, although value may exist for one party, it will not always be fully reflected by transactional evidence. However, this research was seeking to establish to what extent the studies to date show any reflection of sustainability criteria feeding through to market changes. It was not enough simply that the market *should* behave in such a way; it was looking for evidence that it *did*. Often this was not easy to discern as the terminology was at times used with a lack of precision but Figure 14 seeks to set out the reasons postulated in the research to create an 'added value' case for sustainable property.

From this figure it can be seen that there are a range of connections that have been explored and each of these are now examined



5.2 Impact on Capital and/or Rental Value

The most direct evidence of a link between value and sustainability would be an observed change in either or both rents or yields achieved. The papers that address this can be divided into three categories:

- Evidence of transactions;
- Perceptions and opinion studies; and
- Theoretical cases for value change.

All could be argued to provide some level of evidence, but clearly only the first category provides firm evidence; the remaining two categories provide evidence of likely 'direction of travel' of the markets. Each is now considered.

5.2.1 Transactional Evidence

Of all the evidence collected very few comprised transactional studies and, apart from small-scale student work for example, only three major studies have so far been completed and published, although the work by RICS (2005) and Bowman and Willis (2008) provide valuations of individual

buildings which demonstrate some linkage between value and 'green' features, predominantly in Canadian, US and Australian offices. Of the three major studies (Miller *et al.*, 2007; 2008; Fuerst and McAllister, 2008; and Eichholtz *et al.*, 2008; 2009) all are based in the US; all are of offices; all are large-scale and all claim some rental value differentiation in respect of accredited buildings with those that are not.

Miller *et al.* (2007) based their study on Energy Star and LEED certified properties and concluded from this that certified buildings perform better in terms of occupancy rate, rental level and sales price (per sq ft), over non-certified counterparts over the period of 2005-2007. The early results of this work were analysed by Muldavin (2008) who concluded that, whilst providing significant and fundamental support to the argument that sustainable buildings are more valuable, sampling and methodological issues meant that the reliability of results should be carefully considered.

Fuerst and McAllister (2008) analysed a sample of 3,600 properties from the CoStar database using a hedonic price analysis. They found that, even when controlling for important rent determinants such as location, there was a rental premium of 11.8% for sustainable (green) buildings. Additionally, sale price premiums of 31% for LEED and 11% for Energy Star properties were observed. However, the authors concluded that, though the results were important and defensible, they could be explained by the 'hot market' evident at the time.

The results of the study by Eichholtz *et al.* (2009) used a sample approaching 10,000 buildings of which some were accredited. They found an aggregate rental premium in the order of 3% and an effective rental premium of over 6% for accredited stock. However, the evidence suggested only a premium for Energy Star rated buildings, with none found for LEED buildings. This may suggest that it is indeed energy rather than sustainability *per se* which is critical to occupational demand.

Whilst a value differentiation was observed in the studies outlined above, consideration was given by the authors of the possibility that it was less a case of tenants paying *more* for accredited buildings but of the possibility of tenants paying *less* for those which were not.

For the purposes of this review, the question has to be asked: do these studies collectively, point to real evidence that sustainability is now a rental or capital value criterion in the marketplace? All the authors of the studies are realistic in pointing out the very preliminary nature of the linkage. But there are some wider points which are relevant:

- The studies are all US based and the strongest evidence has emerged in relation to California.

- They are based on externally validated metrics such as LEED and Energy Star; the latter is a purely energy rating and, as discussed above, all ratings are only surrogates for sustainability and are not consistent either one with another or over time. It may be relevant that a rating once given is not normally retracted; therefore rating systems do not test ongoing sustainability performance.
- The evidence base does not distinguish between the various levels of rating but only between rated and non-rated buildings. Given that all rating systems are voluntary it is likely that there are many buildings which would achieve high ratings, should their owners choose to pay for accreditation. Accordingly, although the authors have all sought to make adjustments in various ways to ensure the accuracy and robustness of their analysis, the underlying data is, strictly, still non-comparable this is, perhaps, inevitable given the heterogeneity of property.
- The point is made by Miller *et al* (2008) that as governments and some corporates begin to place restrictions on themselves as to the type of property that they will occupy, so buildings which are not rated may diminish in terms of their potential tenant base.
- A true test of sustainability is how buildings will perform over time and this will be influenced by their continued ability to offer flexibility and adaptability to their occupiers and to give occupier satisfaction. Unless and until evidence exists that tenants of such buildings are more likely to renew their leases and that the cost and timing of refurbishments demonstrates their resilience then real sustainability will not have been achieved. The findings from Miller *et al.* (2008) demonstrate both higher rents and occupancy rates for Energy Star and LEED certified buildings; it is unclear if the evidence in relation to rents point to new lettings only or if they also reflect the outcome of rental negotiations during existing lease terms.
- The analysis has only been possible where there is sufficient accredited stock to provide a realistic sample size.
- The evidence adduced relates to rental values; all authors recognised that the number of capital transactions was too limited to allow for meaningful conclusions.

The conclusion that can be drawn of the evidence from these papers is that, within some areas in the US, for offices there is beginning to emerge defensible and robust evidence that rental

differentiation is observable when LEED or Energy Star are taken as surrogates for sustainable buildings.

At the time of writing, no equivalent studies have been undertaken which consider the UK market. It is the view of the research team that this is not due to a lack of interest or indeed the lack of attempts in carrying out such an analysis; instead it is recognised that currently there is insufficient data available to enable a robust study similar in scale to the CoStar study, to be carried out for UK property. It would therefore be futile to conclude that the value link does not exist in the UK simply due to this lack of published evidence.

Investment Property Databank (IPD), commissioned by the Investment Property Forum (IPF), have begun to create a financial performance index for more sustainable properties, the ISPI (IPD/IPF Sustainable Property Index). Based on a simplified version of the framework developed by Ellison and Sayce (2006), the work is therefore not directly linked to a rating system such as BREEAM, but rather seeks to track the performance of a small set of properties. For these, the individual sustainability attributes which have a more pertinent impact have been identified and whilst initial results show no performance differential, the hope is that with a few years of data and further refinement, robust conclusions about sustainability and performance may be possible (see Cudworth & Graham, 2009).

5.2.2 A Matter of Opinion: it is or will be...

Opinion studies formed a significant part of the evidence base collected. They can be sub-categorised into those that are author opinions, based on literature or market experience and those based on surveys. The articles based on surveys have primarily been carried out by real estate consultancies, notably AtisReal, Cushman and Wakefield, GVA Grimley and Jones Lang LaSalle, all of whom regularly conduct surveys to gauge market sentiment.

A firm commitment to sustainability amongst investors operating in the UK market was demonstrated in 2007 by GVA Grimley (GVA Grimley 2007[b]). However the same survey suggested that only a small percentage of investors were seeking to quantify this in any way.

Bowman and Wills (2008), in their large-scale theoretical study based in Australia, included the results of a small survey of some 19 people which provided no evidence as to increased values but a recognition that Green Star rated buildings were likely to be better 'future-proofed' and provide superior returns over the medium to long term but not necessarily in the short term.

A survey of some 125 UK based organisations (AtisReal, 2008) concerning attitudes within the UK, points to sustainable property being likely to present lower risks and be easier to sell or let in the market and possibly even command a premium value. The survey concluded, however, that earlier emphasis on environmental consideration at the expense of social concerns has been too great; as responsible investors start to gain ground, so this will change.

A survey of investor attitudes conducted in New Zealand (Myers *et al*, 2008) comes to a similar conclusion to that expressed previously by Pivo and McNamara (2005), namely that investors will seek to place sustainable properties into their portfolios - but only if a financial case for so doing were to be proven. By implication, in the authors' view, it is not.

Among the recent surveys, that by Jones Lang LaSalle (2008) in conjunction with Corenet Global has been the only one reviewed with a global reach. This survey of some 400 chief executives pointed to an expressed opinion that over 60% would be prepared to pay a rental premium of up to 10% for buildings which were LEED, BREEAM or equivalent rated. No indication as to the level of the label required to achieve addition rental value was given, nor was evidence produced that differential rents were being achieved. This report also indicated that there was a major issue in terms of *lack* of supply of sustainable stock. This raises the possibility that the opinion is based on a perception of an imbalance in supply and demand of rated stock – if this is so then, in time, as more stock comes on the market which does have a rating, it will not necessarily command a premium if, as suggested, that premium results not from intrinsic greater value but from scarcity.

Recently published survey results measure the level of interest in and commitment to sustainability given prevailing market conditions. Support for the view that sustainability is still important to businesses is evident in the Cushman and Wakefield survey of European landlords and tenants (Cushman and Wakefield, 2009). Despite a changing marketplace, 40% of respondents who participated in this survey stated that they focus more on sustainability now than a year ago and 39% of tenants and 44% of landlords report that they would pay a premium to lease or purchase an environmentally friendly building. The majority of respondents expressed a willingness to pay a premium of between 1-5%.

The result of a survey carried out by DTZ of businesses located in Paris, which was published in 2009 (DTZ, 2009), reported that half of the respondent organisations would tolerate a rental increase of 5-10% for an HQE building but that only 21% intended to locate to a sustainable building. The justification for the rental uplift for a rated building was the perception that a considerable decrease in utility costs was possible to achieve.

In work conducted for the IPF by Dixon *et al* (2009), a survey of 50 companies in the UK who had recently entered into new leases of office premises was carried out in order to establish the criteria on which they had selected their premises. The findings indicated that sustainability, although a desired factor, was still of a lower order of significance when compared to traditional selection criteria. These findings confirm those of Knight Frank (2008) that office occupiers within London were placing low importance on energy efficiency and, by implication, sustainability features. However, as this survey was related to new buildings all of which now are built to high standards it is possible that energy efficiency is seen as a '*de facto*' position.

The surveys therefore collectively point to sustainability being a desirable feature for which some say they will pay extra, but where, when tested in terms of actual behaviour as by Dixon *et al* (2009) may not actually put their intentions into practice. From the investor viewpoint, there is interest, increasing knowledge and a perception that they will out-perform moving forward. In reaching this conclusion, the state of the market has always to be taken into account. Where there is a shortage of property within any particular sub-market occupiers will rely on normal criteria; where there is choice, the indication from these studies is that occupiers may well exercise it in favour of accredited stock, or, if the findings of AtisReal (2008) hold, the differentiation will be between those that are 'truly' sustainable across the so-called 'triple bottom line' rather than those which display green credentials.

The other form of opinion work relates to those articles which are short papers and press articles which stem from a single or group expert opinion, based on other documentary evidence. These do not provide a robust argument and for the purpose of the analysis these articles have been excluded. However it is worth noting that they play an important role in terms of increasing industry awareness and in demonstrating that sustainability is on the agenda. In terms of the market moving forward the significance of this type of coverage should not be understated as, whilst not providing defensible evidence of a value link, it helps in underlining the importance of and the case for the concept of sustainability amongst key market players.

5.2.3 In theory it should be happening

There is a wealth of theoretical evidence that links sustainability and value. For example, the work of Boyd (2005); Guertler *et al*, (2005); Robinson (2005); Ellison and Sayce (2006); Ellison *et al* (2007); Bienert *et al* (2008); Lorenz and Lutzkendorf (2008[a] and [b]) and McNamara (2008) all explore the relationships that, arguably, *should* be developing. The nature of this evidence cannot be interpreted in the same way as transactional data; instead the merit of these studies lie primarily in their

contribution to progressing the debate which assists in informing market players and their advisers and in promoting a deeper understanding of sustainability related issues and their likely impact over time.

Within the sample base that can be categorised as theoretical studies, a number of angles have been explored which deal with different value perspectives. A recurrent theme is the differential impact that changes in the marketplace will have on non-sustainable and sustainable buildings. They mainly take as a stance that occupational demand will change over time and that this will impact directly on rental value but also, less directly, will work through the value line in terms of risk and depreciation. McNamara (2008) in particular explores this angle and argues that, as and when occupiers exercise sustainability preferences, so growth rates will differentiate and risk premium will increase for unsustainable stock.

Ellison, Sayce and Smith (2007) considered the impact on investment performance and introduced a framework for assessing the performance of existing properties against a set of criteria linking this to the ability of the assets to perform over time. The model was therefore an attempt at assessing the degree to which properties were 'future proofed'. The authors provided a preliminary quantification of the impacts on investment worth of a range of environmental criteria, including energy and water efficiency and waste management and other less easily quantified attributes such as accessibility and adaptability.

Whilst, in theory, a strong argument exists for a value difference to be noted between sustainable and non-sustainable buildings, as revealed above, only a small number of empirical studies explore this contention in terms of analysed transaction values. A real problem that many articles identify, for example Reed and Wilkinson (2008), is the lack of knowledge about sustainability issues amongst the valuation community. Several authors have demonstrated that it is possible to reflect sustainability in the methods used by valuers. Sayce *et al* (2007), Boyd (2005) and De Francesco (2008) all explore the use of DCF techniques to reflect sustainability features. These studies serve to demonstrate that it is possible to reflect sustainability in property valuation and appraisal using known methods, as pointed out by Boyd (2005); however there is a noted lack of data for producing the cash flow. Lorenz and Lutzkendorf (2008[c]) recognise the difficulty in establishing a quantifiable link but believe, echoing the view of Gilbertson and Preston (2005), that valuers should reconsider their role in order to better advise clients of the potential benefits of sustainable buildings, the case for which, they argue, is now irrefutable in terms of physical performance. Guertler *et al* (2005) support this by suggesting that valuation professionals should look to convey information on sustainability in this case low energy, onto the market in order to reflect and foster the emerging

market. Lowe and Chappell (2007) recognise that the relative infancy of sustainable buildings will require valuers to rely far more on their training and their acquired detailed understanding of the individual property being valued and its specific sustainability features rather than on a body of transactions and standard assumptions. The authors also highlight the need for clients and valuers to work collaboratively and collectively to improve the appraisal process. Similarly, Reed and Wilkinson (2008) argue that valuers have a critical role to play in influencing the market and for this they require a greater level of knowledge of sustainability issues, a matter that RICS is now seeking to address.

The theoretical case is primarily that sustainable buildings will maintain occupier attractiveness moving forward and that, in time, it will be occupational demand that leads to differentiation in rental values and, as a consequence, capital value. Over time such properties will be lower risk investments and be differentiated by rent and yield from stock which is not so 'future-proof'. Whereas anecdotal and perception studies (e.g. Jones Lang LaSalle, 2008) indicate that this will take the form of rental premiums being achieved, other authors (Ellison et al., 2007; McNamara, 2008) take the view that buildings which lack sustainability features will begin to lag behind in terms of rental growth and this will ultimately lead to adverse yield movements (DTZ, 2007). Additionally, theoretical studies often take the view that stock lacking sustainability features will require investors to expend further capital in order in order to reposition assets within the market (DTZ, 2007) and undertake more frequent and costly refurbishments (see for example GVA Grimley, 2007[a]), thus increasing the rate of depreciation.

These arguments again come back to the issue of defining sustainable buildings; in particular the ability to predict with accuracy which 'green' or sustainable features will be important in moving forward. Only a few years ago, the literature pointed heavily to a weighting on energy efficiency and the terminology was dominated by talk of 'green' buildings. Indeed, the transactional evidence has been focused on 'green'. More recently, however, particularly as the literature in relation to Responsible Property Investment is beginning to develop (see for example, Pivo and McNamara, 2005; Pivo, 2008; McNamara, 2008; Grasskempe, 2008) the agenda is beginning to change.

If the value link which is beginning to emerge for some localised submarkets, as evidenced by the transactional studies, is to develop, far greater analysis as to which aspects of environmental and social considerations are likely to influence both occupiers and investors is needed.

5.2.4 Other Investor Considerations

The link between value and sustainability explored above relates to market pricing, both in terms of rent and capital value. However, to investors, factors other than market value are important in the investment decision. As they are fundamentally concerned with performance moving forward, considerations of risk to future income flow, depreciation, and future saleability are critical. Collectively these factors can be considered those that which will 'future proof' an investment (Ellison *et al.*; 2007; DTZ, 2007; Bowman and Wilkinson, 2008). Within the literature, several authors have addressed these concerns theoretically, (De Francesco, 2008; Reed and Wilkinson, 2005; Lorenz and Lutzkendorf, 2008 [a]) whilst perception surveys (for example Keeping, 2002; GVA Grimley, 2007b) highlight that the attractions of sustainable buildings are that they are less likely to suffer voids and premature obsolescence. Whilst such factors are, for the most part, not argued to be resulting in a price differential at the moment, they are all given as reasons why this will occur in the future, especially as legislative regimes place increasingly stringent environmental performance criteria into effect (Jones Lang LaSalle, 2006[b]).

Two other investment reasons in favour of sustainable buildings can be found from the literature. One relates to ethical or social motivations (Jayne and Skerratt, 2003) and the concept of the universal investor (Pivo and McNamara, 2005); the other rests on the ease with which it might be able to raise purchase finance for such buildings. Whilst the first argument is related to the growth of responsible property investment, the other is not. Rose (2005), writing in relation to residential development, argues that 'green buildings' are easier to finance and that lenders are prepared to lend to higher loan to value ratios, which in turn increases purchasing power and hence pushes up value. This American article was written before the collapse of the sub-prime market and doubtless is not the current situation, but the ability to finance based on likely future performance is an issue that, whilst not yet well documented, is another potential and important link.

5.2.5 Summary

In summary, transactional evidence is beginning to emerge in some parts of the US that rental differentiation is observable between accredited and non-accredited prime office stock. But the transactional base is very small, and the authors acknowledge that there were limitations on their findings. This transaction base is supported by some valuation and appraisal studies based on expert evidence. Apart from this, a significant body of theoretical work which rationalises how the markets will develop has been published and attitudinal surveys point to much greater awareness among market participants. It also indicates that a reduction in risk and obsolescence is likely to underscore

differences in performance moving forward. But in terms of whether the link is substantiated by firm evidence, Clark's conclusion (Clark, 2007) that *"value is not yet seen...it is the biggest block to sustainability"* is still valid on the balance of published evidence.

Before arriving at some overall conclusions, the issue of occupational benefits and costs will be reviewed as these add support for the evidence above.

5.3 Value to the Occupier

Underlying much of the literature relating to value and sustainability is the argument that sustainable buildings are worth more to occupiers, due to the fact that they may be more economic to run and offer better working environments; this in turn assists with work productivity and health and wellbeing. Again much of this literature is focused on offices.

Many of the papers, particularly the earlier ones, argued that sustainable buildings would be worth more simply on a business case (for example Sustainable Construction Task Group, 2001; St Lawrence, 2004). Others have made an assumed connection that revenue savings in the hands of the occupier would lead to increased value, either because the property will be more efficient and offer the ability to establish better working practices (see for example, Kats, 2003) or because lower outgoings will enable the tenant to pay more rent leading to higher capital value (Robinson, 2005).

There is a large body of research outside the immediate remit of this study that investigates the correlation between employee health and wellbeing and productivity and building design features. Many of the articles within the sample literature also discuss this relationship and many consider the promotion of occupier health and wellbeing to be a key attribute of sustainable buildings. The issue of occupier health and wellbeing is an important concern for employers, in particular those who have in place and wish to act upon a CSR policy. It follows that it is an attribute of buildings mainly considered in terms of the occupier perspective.

Kats (2003), Robinson (2005) and Yudelson (2007) amongst others have considered the links between occupier health and productivity as a function of building environment and have all demonstrated a possible link to the increased value of buildings resulting from this. Kats (2003) demonstrates that there are significant productivity gains to be made from occupying LEED certified buildings (his example based on the state of California estimates between \$36.89 and \$55.33 per square foot per year). Robinson's (2005) analysis focused on the occupier perspective and demonstrated that in terms of worth sustainable buildings can generate higher values or benefits.

The argument that revenue savings and occupational benefit will, in time, translate into higher value has been developed as a dominant theme within some of the theoretical work (Reed and Wilkinson 2005; Persram *et al*; (2007); it is also a common thread in the perception/ opinion surveys (Jones Lang LaSalle, 2006[a]; [b] and 2008; GVA Grimley, 2007[a] and [b]; Knight Frank, 2008). Whether or not this proves to be the case depends, in part, on whether valuers perceive these qualities to be sufficiently tangible to be reflected in their valuations. Lowe and Chappell (2007), writing from a US perspective argue that the features of 'green buildings' *should* focus the valuer on operational performance rather than financial performance, and this argument has also been made by Lorenz and Lutzkendorf in their papers.

However, valuers of commercial buildings can only reflect the impact of revenue savings and occupational benefits if they translate through to evidenced demand. In the absence of rental and capital value transaction evidence, some studies, (for example, RICS, 2005; Bowman and Willis, 2008) look predominantly at owner-occupied buildings and give case studies where advantage or added value is perceived through the valuation process.

For owner-occupiers, particularly of new buildings, the business case has long been about balancing build costs against improved productivity and the ability to achieve whole-life cost benefits as a result of reduced maintenance and refurbishment costs. Increasingly it has been argued that green buildings are not significantly more expensive to build (see for example Broughton, 2006 and Katz, 2008). These studies conclude that the cost argument against building 'green' can be dismissed, as such buildings can be developed at little or no extra cost. However, work by Cyril Sweett (2007) and by Yudelson (2007) conclude that challenges still remain in terms of cost benefits. Much depends on the actual design and type of building along with location.

The cost-benefit argument has now been extended to existing buildings with, for example, work by Davis Langdon (2007) concluding that refurbishing buildings to Green Star standards in Australia is cost effective as building life is extended and depreciation may decrease. Within the UK, work by McAllister *et al*, (2009) points to certain refurbishments to achieve low carbon standards being cost effective over relatively short time horizons.

Cost savings and occupier benefit arguments will only be substantiated if buildings perform to their expected specification. Two recent studies suggest that this may not always be the case. Turner and Frankel (2008), in their analysis of LEED rated new office buildings conclude that anticipated cost benefits may not always be delivered and within Australia a study of three university buildings by Paul and Taylor (2008) revealed that the comfort of workers was not enhanced by working in an energy efficient 'green' design building.

Another driver towards an increase in demand for more sustainable buildings lies in the increasingly stringent legislation such as, for example, in relation to energy labelling and energy standards and the requirement in some countries for new builds to include renewable energy sourcing. Additionally, some authors have identified the increasing requirement on public sector tenants to occupy only accredited buildings. In the short to medium-term as recovery from the world recession may well be public-sector led, this requirement could well start to influence markets. Whilst not expressed so specifically, several articles do point to the role of legislation as being a key driver in demand for property (e.g. Strathon, 2007; Parnell, 2008)

The last strand of the occupier case rests on the social impact of buildings. Whilst Dixon *et al.* (2009) found little evidence that sustainability was a dominant factor in tenant's choice of building; they did find that occupiers want buildings that can help them effect cultural change and foster more sustainable practices. In this, their findings support the views expressed by tenants in the OPD's Occupiers Satisfaction Survey (2008) that they wish landlords to improve the sustainability of their buildings. This literature review has not considered articles related primarily directed to the growth of Corporate Social Responsibility (CSR), but as numerous authors have argued, the incorporation of CSR principles into all aspects of business life will increasingly affect both occupier and landlord views (see for example, Newell, 2002; Sayce et al., 2004; Roper and Beard, 2006; Rapson *et al.*, 2007).

5.3.1 Summary

The notion that sustainable buildings will, or do, outperform their non-sustainable, or less sustainable, counterparts, has led to the conclusion by many authors that this will automatically lead to a differential in value. The case has been easier to create within the owner-occupied sector and several articles argue that this creates a business case that adds value. However, it is not clearly evidenced within the pricing mechanism though it can be supported by some valuation studies (e.g. RICS, 2005).

Within the tenanted sector, the argument is that revenue savings by the occupier will result in the ability to pay more rent and that better specification will reduce obsolescence. Accordingly such buildings are likely to be 'future-proofed' and provide better long-term performance. Whilst much of the literature is supportive of these arguments, some studies have indicated that green buildings do not necessarily provide the benefits that were anticipated; if this is so, differential performance is unlikely to ensue. It is only if prospective tenants can see and understand the advantages of occupying sustainable buildings and are presented with reliable data on which to make decisions that they will be likely to differentiate their rental bid. Even so, it remains unproven that they will be willing to simply bid away any financial savings by the way of additional rent.

5.4 A Consideration of the Wider Stakeholder Case

Throughout this review the definition of value has been restricted to that which is recognised in the marketplace within the transaction process (Market Value and Market Rental Value) and value to the occupier as recognised through revenue savings or productivity increase resulting from good environmental conditions. However it is acknowledged that this is a very narrow interpretation of 'value'. As many authors argue, buildings have significant economic impacts not only on their owners and occupiers at a larger scale, but to wider communities. In considering the issue of whether to demolish or re-use redundant buildings, Sayce *et al.* (2004) argue that buildings have a value to their 'external stakeholders' which is only recognised where buildings have legislative protection but which should be incorporated in financial appraisals if true triple bottom line sustainability is sought. Burnett (2007) takes the connectivity further by arguing that the promotion and development of sustainable stock can actively support city level positive impacts.

The work of the United Nations Environment Programme (UNEP) in promoting its tenets for responsible property investment (UNEP FI, 2009) is now promoting investment policies and strategies in which third party interests are key to property decision-making. If and when the signatories to such initiatives grow, so in turn investor responses will be likely to feed through to market practice. For the moment, however, for commercial property these wider considerations are not argued in the literature to be determinants of exchange value.

6 CONCLUSIONS

The aim of this study was to examine the published literature that seeks to connect market value with sustainability. The review has revealed a wide number of publications, but when those of an anecdotal nature and press reports of survey work are excluded, the number of articles falls very significantly. The research that was available points to dominance by US, Australian and UK literature, with some significant contributions from Canada, New Zealand and Germany. However as the literature reviewed was restricted to that published in English, this may represent some bias in the sample. Nonetheless, as these countries have what is often argued to be the most transparent and mature property markets it is perhaps understandable that they include the most comprehensive literature.

The connections began to be argued about a decade ago mainly founded on notions of a 'business case' which was based on cost reduction for occupiers and reputational advantage to the owner. Some authors made and still make the connection that revenue savings in the hands of an occupying tenant will work through into the rental bid, and this view is widely supported by theory. Other advantages too, such as reduction of long-term risk and 'future-proofing' against decreased value due to obsolescence are very evident in the literature. However, without exception, the theoretical articles, some of which admittedly are now several years old, point to the future not the present. Additionally, all articles agree that market values derive from observed prices as analysed by valuers. Whilst few argue that valuers should make markets, valuers need to thoroughly understand individual properties and specific sustainability assets rather than relying on standard assumptions. Such knowledge requires valuers to educate themselves in sustainability considerations and in doing so, the valuation community will be well placed to foster the emerging markets by advising and informing clients as to the 'direction of travel'.

From an investor perspective, not only is the risk reduction argument seen as critical, so too is the ability of sustainable buildings to provide an expression of CSR credentials and as and if the RPI movement gains traction, so this is likely to become a prevalent argument.

Many of the articles reviewed took the form of surveys of investors, actual and potential, and of tenants. The results often give credence to the view that sustainable buildings are worth more. However, the nature of *intention* is that it is just that – intention not actuality.

Data examining what is happening in the marketplace is scarce, but over the last two years has begun to emerge in the form of a handful of large-scale studies based on the US office market. The authors of these studies acknowledge that the evidence is still tenuous and generally goes no further

than to point to a connection between higher rents achieved for LEED and Energy Star accredited buildings compared with similar but not accredited buildings. There is no substantive evidence that points to any firm connection with increased capital value achieved on sale. But this does not undermine the importance of the findings. Among the most recent research within the UK, findings of a study examining the importance of sustainability in the criteria applied to office lettings showed no rental differential and that, whilst sustainability is on the 'nice to have' list, other traditional criteria were found to take precedence.

So, do sustainable properties achieve higher values than their non-sustainable counterparts? Quite apart from the paucity of transactional data yet available, one of the biggest difficulties facing researchers and analysts alike is the lack of a firm understanding of just what constitutes a sustainable building. To use a rating system, such as LEED or BREEAM as a surrogate, is the most obvious and commonly followed solution. However, these systems are not fully comparable, they emphasise the environmental over other aspects of sustainability, they change over time, they are voluntary and for the most part they relate primarily to new buildings. This is not a criticism of rating systems, but it does render their use as a benchmark against which to assess value problematic, as those who have undertaken empirical studies acknowledge. Moves towards a universal definition of 'sustainable buildings' are beginning to manifest themselves, typified by the work of the UK Green Building Council (2009), as are those in internationally comparable and aligned rating systems. As these begin to filter down into markets, so the basis for reliable evidence to emerge will be stronger.

The evidence as it stands to date and as revealed through the literature points to some early signs that, within the US office market, the theoretically argued case is beginning to be working through to an actuality, particularly for certified buildings. For other markets and locations, published evidence to support the linkage between sustainability and enhanced value is not yet apparent. This is not to say that the connection is unfounded, but points more to a fundamental lack of underlying data and appropriate methods to draw out reliable and meaningful conclusions.

7 RECOMMENDATIONS

It is clear from the study that the issue of value and sustainable property has been extensively and frequently explored. However, most empirical attempts have been frustrated by an inability to extract robust data. As such, there are a number of recommendations which are paramount to ensure that moving forward, all stakeholders and in particular valuers are able to access and accurately analyse the necessary data to understand and evaluate the link between sustainability and the enhanced value of all types of property. These are:

Professional and Academic Education:

Property professionals are seen to have a critical role to play in the embedding of sustainability principles in the built environment. On the subject of value, whilst it is recognised that valuers should not lead markets, observed prices are inevitably the product of negotiations based on professional advice. The entire property profession therefore has a significant part to play in fostering these emerging markets by informing clients as to the 'direction of travel' with regards to the impacts of sustainability. **It is recommended that RICS reinforce this role through future guidance and practice information.** To progress the industry in this respect, the provision of education for property professionals, both pre- and post-qualification, must incorporate a focus on sustainability. Academia, which is at the forefront of pre-qualification development, should seek to embed sustainability into courses in line with industry requirements and to achieve this **it is recommended that feedback loops are developed between industry and academia.** Post-qualification development must further broaden knowledge of sustainability and **it is recommended that RICS, CPD providers and the industry at large continue to develop opportunities for education within the subject of sustainability.**

Definition and Understanding of Sustainable Buildings:

Throughout the research, the lack of understanding of what constitutes a sustainable building was prevalent. The interchangeable use of the terms 'green' and 'sustainable' was evident in the literature both internationally and nationally, and whilst analysis revealed little difference between what is meant by these labels, those using the term 'sustainable' often considered a wider range of factors. This definitional issue is not only a barrier to establishing the value link, but it is also preventing the industry from fully embedding sustainability into new and existing properties. The UKGBC is currently working to develop an acceptable definition of sustainable building based on qualitative measures and **it is recommended that RICS leads further work into arriving at an industry-wide definition of sustainable buildings which can form the framework for benchmarking**

which would drive the incorporation of sustainability into new and existing properties and assist valuers in the preparation of valuations.

The Availability and Quality of Data:

Transparency within property markets remains the most significant barrier to establishing a link between value and sustainability. As demonstrated by the CoStar study, the use of a rating system in conjunction with data relating to values has proved a workable basis for the analysis of the link between sustainability and value in property. In the UK, information about a building's rating is not in the public domain and this is a significant reason why so far, with exception from the work currently being carried out by the IPD which uses an alternative framework, the industry has been prevented from carrying out empirical studies focusing on transactional data and sustainability in buildings. **It is therefore recommended that data relating to building certifications such as BREEAM be made more accessible to the public.** Another option would be to further develop EPCs to capture more information regarding buildings. **An industry-wide consultation in conjunction with Government on the options available is recommended, which should also include a consideration of the type of data that ought to be captured and made public in order for the values of sustainable buildings to be tracked and measured.** Such a development is linked to arriving at a consensus of what constitutes a sustainable building (see below).

Building Rating Systems:

Whilst the research reveals the use of building rating systems as a common proxy within studies for a sustainable building, this methodology, as noted by authors, has limitations. Each of the rating systems has a different set of criteria, they tend to be focussed on environmental concerns and their composition changes over time, making comparability both nationally and internationally problematic. Attempts to address this issue are emerging through memoranda of understanding between national organisations and **it is recommended that the industry support the development of an internationally aligned and accepted rating system for buildings.** Additionally, building rating systems are identified as a potentially valuable tool for property professionals in advising clients on sustainability matters and potential risk reduction and as such, their role in markets is likely to increase. **It is therefore further recommended that RICS leads research into use and application of rating systems and tools for sustainable building and how they can be harnessed to inform property consultancy and valuation processes.**

The Development of a Sustainable Property Index:

The work carried out by IPD and IPF represents a significant first step towards measuring and tracking the performance of sustainable buildings. Whilst a link, theoretically and anecdotally, is expected to be established in time a standard argument against further investment in sustainability in buildings is the lack of market data combined with expectations of long payback periods. Whilst the latter has been addressed in part by recent research, the development of a Sustainable Property Index is considered an important step in both developing the understanding of the possible value link and eventually establishing robust evidence of enhance performance. **It is therefore recommended that industry continue to support IPD in the creation of a sustainable property database and index and participate by providing robust portfolio data for inclusion within the index.**

Understanding of Tenant Demand:

As the literature has revealed, the strongest value driver for sustainable buildings is expected to be tenant demand. From the point of view of landlords it is important to understand what sustainability features that tenants want and as such, those which will prove most valuable, however little research exists which fulfils this requirement. **It is recommended that further research is undertaken in this area to develop a more detailed knowledge of the most important sustainability considerations and building features to tenants. Such work should include the analysis of tenant views as expressed through post-occupancy evaluation and through analysis of rent review and lease renewal transactions as these start to measure performance over time.** Such a project should seek industry collaboration and it is recommended that RICS seek the participation of major industry associations such as the British Council for Offices, British Retail Consortium and CoreNet Global in undertaking the research..

The Functional and Economic Depreciation of Accredited Buildings:

Many of the studies undertaken make the theoretical case for sustainable buildings being 'future proofed' and less susceptible to the need for refurbishment and obsolescence. This by implication means that they will continue to attract tenants and purchasers. In addition to work taken to understand current and future tenant requirements, and the susceptibility of accredited buildings to the need for refurbishment should be tested. **It is recommended that work is undertaken by industry and academia to investigate whether properties designed for highly sustainable performance do indeed withstand the need for capital injection better than conventional properties.**





Understanding of the Impact of Responsible Property Investment on Value:

The research has made reference to the rise of the Responsible Property Investment (RPI) movement and within this to the UNEP. This work advocates a changing list of investment decision-making criteria which embrace, *inter alia*, the desire of investors to evaluate third party impacts of their decisions and the intention to promote the notion of community improvements and social regeneration through investment policies. Whilst some theoretical work has started to raise questions and ideas about how this relates to investment pricing, there is no empirical work to examine the impact of RPI on investment pricing. **It is recommended that RICS leads research in this area to derive a better understanding of how social values and third party interests interface with and influence market value.**

The Link between Sustainability and Value in Other Sectors:

To date, a majority of the research, particularly empirical studies, into price differentiations between sustainable and non-sustainable property has been focused on the prime office sector. However, this narrow focus represents only one aspect of commercial property. This is despite widespread recognition of both the impact of other sectors, namely retail and industrial, and some exemplar developments in these sectors. Additionally, the industry would benefit from studies which examine the effect of sustainability on value in secondary areas rather than prime CBDs. Therefore, to fully establish if there is a market trend developing which places a higher value on more sustainable property **it is recommended that the industry, in conjunction with academia, conduct similar studies into value and sustainability in other sectors and locales of the market.**

APPENDIX A: OVERVIEW OF ENVIRONMENTAL BUILDING RATING SYSTEMS

	Country	Size (Units Certified)	Established	Criteria
 BREEAM	UK	Over 1000 certified commercial buildings (of which 620 fall under BREEAM Offices)	1990	<ul style="list-style-type: none"> • Management • Energy Use • Health & Well Being • Pollution • Transport • Land Use • Ecology • Materials • Water
 LEED	USA (mainly)	1823 worldwide (at Feb 2008)	1998	<ul style="list-style-type: none"> • Sustainable Site Development • Water Savings • Energy Efficiency • Materials & Resource Selection • Indoor Environmental Quality • Innovation in Operation • Innovation in Design
 Energy Star	USA	7778 buildings (3124 of which are Offices)	1992	<ul style="list-style-type: none"> • Energy Efficiency • Building Systems • Building Maintenance
 Green Star	Australia	146 certified (140 of which are for Offices)	2003	<ul style="list-style-type: none"> • Management • Indoor Environmental Quality • Energy • Transport • Water • Materials • Land Use, Site Selection and Ecology • Emissions

GLOSSARY

The following provides definitions of some of the key terms used in the report:

Appraisal

An expert opinion on the value of a property; the act or process of estimating value.

Building Research Establishment Environmental Assessment Method (BREEAM)

A method of assessing the sustainability performance of both new and existing commercial buildings primarily based in the UK.

Cash Flow

The movement of cash into and out of a business, project or financial product; or the difference between cash revenues and outlays, over a given period.

Central Business District (CBD)

The area of a city where the dominant land use is intensive commercial activity, and generally characterised by a high concentration of office and retail floorspace.

Corporate Social Responsibility (CSR)

The conscious inclusion of environmental and social concerns within an organisations activities, corporate decision-making and relationships with stakeholders.

Depreciation

The decrease in the market value of an asset over time due to use or obsolescence.

Discounted Cash Flow (DCF)

The present value of the estimated future cash flow to be derived from an investment in a capital asset, over a given period of time. DCF can also mean the technique for analysing the viability of a capital investment project by discounting all budgeted, or projected, income and expenditure flowing from or into a project, including the initial outlay and any residual value.

Energy Performance Certificates (EPC)

A mandatory certification required when a building is being sold, built or rented, that provides an energy efficiency ratings (from A-G) and recommendations for improvement

Energy Star

An energy performance rating system for commercial, institutional and industrial buildings developed by the US Environmental Protection Agency. The rating can also be used to determine whether a property qualifies for Energy Star recognition.

External Stakeholders

Entities, such as wider society, which exist outside of a particular organisation or activity but have a direct interest over it

Future Proof(ed)

The process of designing in anticipation of future developments in order to minimise the negative effects of these changes to avoid future obsolescence.

Green Lease

A lease which has additional provisions set out within it whereby the landlord and the tenant undertake specific responsibilities/obligations with regards to the sustainable operation of a property for example, energy efficiency measures, waste reduction/management and water efficiency.

Green Portfolio

An investment portfolio which invests solely in assets that display positive environmental, social and governance (ESG) practices.

Hedonic Pricing/Regression

The use of statistical techniques; such as regression analysis, to determine the contributory value of the constituent characteristics of a particular item.

Investment Property Forum (IPF)

An independent membership organisation aimed at improving the awareness, understanding and efficiency of property as an investment.

IPD/IPF Sustainable Property Index (ISPI)

A current project producing a financial performance index of the more sustainable properties in the market by developing a system to identify and then track the investment performance of the more sustainable commercial buildings in the UK on a quarterly basis.

Kyoto Protocol

An international environmental treaty establishing a legally binding commitment for the reduction of greenhouse gases by specified targets.

Leadership in Energy and Environmental Design (LEED)

A method of assessing the sustainability performance of both new and existing commercial buildings primarily based in the US.

Loan to Value Ratio

The amount of capital borrowed as a percentage of the appraised market value of the property.

Market Value

The estimated amount for which a property should exchange on the date of valuation between a willing buyer and a willing seller in an arm's-length transaction after proper marketing wherein the parties had each acted knowledgeably, prudently and without compulsion.

Obsolescence

The loss of desirability or usefulness due to changes in design, use or advances in market requirements.

Occupancy Rate

The percentage of all rentable units that are occupied or rented at any given time.

Owner-Occupied

A property where the owner occupies all or part of the property.

Responsible Property Investment (RPI)

Combining the social, environmental and economic considerations of the property investor with their financial objectives.

Risk Premium

The excess return over a risk-free asset (commonly Government gilts) which investors will require to compensate for the higher risk associated with holding an asset such as property; dependent on a range of characteristics.

Stock

The supply of property; on hand, within the market.

Sub-Market

A segment or portion of a larger market identified on the basis of one or more attributes that distinguish it from others.

Triple Bottom Line

The view of sustainability; coined by John Elkington (1997), which measures organisational (and societal) success against economic, environmental and social considerations.

Valuation

The act or process of determining the value or worth, an assessment of the market value of a property at a given time. According to the RICS Red Book (2009):

A member's opinion of the value of a specified interest or interests in a property at the date of valuation, given in writing. Unless limitations are agreed in the terms of engagement this will be provided after an inspection, and any further investigations and enquiries that are appropriate, having regard to the nature of the property and the purpose of the valuation.

Whole-Life Cost

The total cost of ownership over the life of an asset, through planning, acquisition or development, operation, maintenance and refurbishment and ultimately replacement or disposal.

Yield

The net income or profit from an investment expressed as a percentage of its cost or the capital invested, usually calculated at an annual rate; the actual rate of return on capital.

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Annotated Bibliography

From the sample collected for analysis, the Research Team selected a range of articles which it felt would be of particular use to readers of the report. Whilst the bibliography is intended as a resource outlining the key literature regarding the subject, online articles remain the responsibility of the original author/publisher and as such accessibility to all references cannot be guaranteed. Should an online article become unavailable, it is recommended that you contact the author/publisher to obtain a copy. Where possible the source has been included to assist, however, some articles require the following:

*** Paid subscription to journal/resource may be required for access**

**** Registration to website required for access (free)**

Name/Title	Author(s)/Publication	Availability (Source)	Date	Summary
<i>Greening UK Cities' Buildings - Improving the Energy Efficiency of Our Offices, Shops and Factories.</i>	All Party Urban Development Group	Online: http://www.centreforcities.org/assets/files/APUDG4.pdf	2008	A UK All Party Parliamentary Group report reviewing written stakeholder submissions and existing literature to establish challenges to 'greening' existing buildings by making them less dependent on carbon sources and/or more energy efficient. The report finds that there are significant barriers to greening existing stock namely, information scarcity, economics of retrofitting (including the owner/occupier responsibility) and property specific physical barriers. The report draws on anecdotal evidence from stakeholders which confirm a lack of evidence to support a rental/value premium for energy efficient buildings.
<i>Valuing Yesterday's Office Buildings</i>	Arundell, B. RICS	Online: http://www.rics.org/NR/rdonlyres/8C80CEC1-21C1-4C88-A514-ACCDD7F8C348/0/ValuingYesterdaysOfficeBuildings.pdf	2009	A presentation tackling the value proposition of sustainable building from the angle that 'yesterday's' non-green buildings will suffer falling values due to a range of obsolescence and demand issues. The presentation also discusses whether existing valuation tools are capable of incorporating sustainability and finds that DCF is the most suitable approach.
<i>'True' Sustainability and the UK Property Market</i>	Atisreal London	Online: http://www.seeandthink.com/uploads/89C23DC1-CDAB-6F04-E8E90BC693AE118C/Sustainability%20Report.pdf	2008	An attitudinal study based on a survey carried out in 2007 of 125 industry representatives. Key findings support the notion that investing in sustainable buildings will reduce investment risk and the likelihood that companies 'will' pay a premium (both rental and purchasing) for truly sustainable property.
<i>Green Rhetoric Exceeds Reality</i>	Bennett, E. New Analysis, CMP Information Ltd	Online: http://www.architectureweek.com/cgi-bin/wllk?http://www.bdonline.co.uk/story.asp?storyCode=3067597	2006	A short article comprising a report on the British Council for Offices (BCO) conference 2006 discussing the issue of sustainable offices and the market failure to move towards sustainable buildings. The article argues the point that market and value transformation is being hindered by a conservatism and lack of understanding by agents of the benefits of sustainable building.

<p><i>Models to Evaluate the Quantitative Effects of Climate Change on Real Estate Markets</i></p>	<p>Bienert, S.; Wagger, C.; & Steixner, D. 14th PRRES Conference Paper, Kuala Lumpur, 20-23 January</p>	<p>Online: http://www.pres.net/papers/Bienert_Models_to_Evaluate_the_Quantitative.pdf</p>	<p>2008</p>	<p>A theoretical paper which discusses how climate change should be reflected in valuations. It suggests modelling via insurance risk premium adjustments as a proxy.</p>
<p><i>Valuing Green: How Green Buildings Affect Property Value and Getting the Valuation Method Right</i></p>	<p>Bowman, R. & Wills, J. Green Building Council, Australia</p>	<p>Online: http://www.gbca.org.au/docs/NSC0009_ValuingGreen.pdf</p>	<p>2008</p>	<p>A major study drawing together previous literature with a snapshot survey of 19 industry stakeholders and case studies of Green Star buildings. The study extruded many findings including: <ul style="list-style-type: none"> - Attitudinal evidence of willingness to pay more for Green Star buildings - An inextricable link between sustainability and future capital value - Evidence suggesting some Green Star buildings from the case studies had achieved lower capitalisation rates upon sale. <p>However, the report concluded that, at the time, it was still to early to quantify rental premium and enhanced market value due to a lack of specific market valuations.</p> </p>
<p><i>Can We Assess The Worth of Environmental and Social Characteristics In Investment Property?</i></p>	<p>Boyd, T. Queensland University of Technology, Brisbane 11th PRRES Conference Paper, Melbourne, 23-27 January</p>	<p>Online: http://www.pres.net/Papers/Boyd_Assess_Environmental_Social_Characteristics_Investment_Property.pdf</p>	<p>2005</p>	<p>An academic paper examining existing literature regarding the link between a building's environmental and social characteristics and worth. The paper also takes a case study of an existing prime office and models projected future performance using DCF techniques. Findings from the case study contradict those of other papers in respect to the strong benefits from enhanced sustainability features and reiterate the limited international literature demonstrating the impact of sustainability on assets. It also raises concern over the ability of traditional valuation methods in dealing with the matter.</p>
<p><i>The Triple Bottom Line Approach to Property Performance Evaluation</i></p>	<p>Boyd, T. & Kimmet, P. 11th PRRES Conference Paper, Melbourne, 23-27 January</p>	<p>Online: http://www.pres.net/index.htm?http://www.pres.net/Proceedings/2005proceedings.asp</p>	<p>2005</p>	<p>A joint paper which revisits much of the work and criteria of Boyd (2005; see above) The paper highlights the potential for attempts to satisfy environmental and social benchmarks to contribute to premium values but concludes that as yet the case cannot be emphatically argued.</p>

<p><i>Green Building Costs, Saving and Value</i></p>	<p>Broughton, J. Environmental Design and Construction Magazine, July 2006</p>	<p>Online: http://www.edcmag.com/Articles/Column/BNP_GUID_9-5-2006_A_10000000000000000031345</p>	<p>2006</p>	<p>An article summarising data from industry sources regarding market momentum, costs, operational savings and financial value. The paper argues that cost premiums in developing green buildings are not substantial, (if they exist at all). The paper further concludes that tangible and non-tangible benefits perceived by occupants, combined with lower operating costs, can result in higher appraised value. However this is not supported by market transactional evidence.</p>
<p><i>The Role of Information in a Sustainable Property Market</i></p>	<p>Bruhns, H. RICS Foundation</p>	<p>Online: http://eprints.ucl.ac.uk/13096/1/13096.pdf</p>	<p>2004</p>	<p>A short report reflecting on the availability of information with regards to sustainable property. The report finds that 'strong' data and information are essential for the future progress and integration of existing data to develop the mathematics behind sustainability. By implication, value relationships cannot be successfully determined within such data.</p>
<p><i>Survey of Property Trends - 'Green Issues'</i></p>	<p>CBI/GVA Grimley London</p>	<p>Online: http://www.heepi.org.uk/1st_dec_event/CBIWinter04supp.pdf</p>	<p>2006</p>	<p>A short attitudinal study examining trends towards environmentally efficient property. The findings of the study suggest occupiers are attaching an increasing importance to energy-efficiency, with the associated cost savings perceived as the main benefit. However, the report finds that a majority of respondents were only prepared to pay marginally more, if any to occupy environmentally friendly buildings.</p>
<p><i>Corporate Real Estate Survey</i></p>	<p>CBI/GVA Grimley London</p>	<p>Online: http://www.gvagrimley.co.uk/Prebuilt/GVAConnect/Publications/Corporate%20Real%20Estate%20Survey%20(2007-8).pdf</p>	<p>2007</p>	<p>A survey of corporate real estate managers, investigating, <i>inter alia</i>, attitudes towards green and sustainable buildings. It finds, from an unspecified sample size, that lower costs are seen as the major benefit. It further finds that whilst there is a willingness to pay more for occupation in some sectors, this is only marginal.</p>
<p><i>Sustainability and Energy Efficiency: The Implications for the Irish Commercial Property Market</i></p>	<p>CBRE Ireland</p>	<p>Online: http://www.cbre.eu/emea_en/research/special_topic_reports</p>	<p>2007</p>	<p>A report which suggests that the Irish property market has not yet embraced sustainability. However, it concludes that this is predicted to change in light of more sustainability aware occupiers and investors. It also considers that the introduction of EPCs will have an impact.</p>

<p><i>Who Pays for Green? The Economics of Sustainable Buildings</i></p>	<p>CBRE EMEA</p>	<p>Online: http://www.cbre.eu/emea_en/research/special_topic_reports</p>	<p>2009</p>	<p>A report discussing the increased general recognition of the importance of sustainability. In relation to the link between value and sustainability, it quotes research carried out by St James which suggests that the willingness to pay for environmental features in homes is less than the cost of installing these. The findings from Miller, Spivey and Florance (2007) which show increased rental and capital value for green buildings are summarised.</p>
<p><i>Who Pays for Green: The Economics of Sustainable Buildings</i></p>	<p>CBRE London</p>	<p>Online: http://portal.cbre.eu/portal/page/portal/public/Public%20PDFs/CBRE_Who_Pays_For_Green_2009.pdf</p>	<p>2009</p>	<p>A report which brings together a range of issues on the debate surrounding by how and how costs for sustainable building should be borne. The report tackles four main areas: evaluation of green buildings, cost of building, evidence of willingness to pay a premium, energy usage savings.</p> <p>The report concludes that there are still significant issues in assessing the scale of payback for additional costs in value and pricing. It further notes that energy savings create a great deal of headroom in terms of rent premia. Citing previous US studies it argues evidence for enhanced rents and suggests that this combined with enhanced rental growth should reflect over time in a clear yield differential. However, it gives no suggestion that such cost saving reflects on value today.</p>
<p><i>Special Considerations In The Valuation of Sustainable Properties</i></p>	<p>Chappell, T. & Lowe, T. PREA Quarterly Summary</p>	<p>Online: * www.prea.org</p>	<p>2007</p>	<p>An article discussing the issue of addressing sustainability within property valuations.</p> <p>The paper prompts valuers to consider and report on sustainability considerations within their valuations; however it notes that there is a lack of empirical transactional data on which to base valuations. It also highlights the issue of 'who pays for what and when' as a concern which will ultimately impact on value.</p>

<p><i>High Performance Green Building: What is it Worth?</i></p>	<p>Chappell, T. & Corps, C. Cascadia</p>	<p>Online: www.cascadiagbc.org/news/index.html/GBValueStudy</p>	<p>2009</p>	<p>A US/Canadian report investigating whether green features impact on asset value and market positioning. The study is aimed at helping architects/designers understand the valuation perspective of sustainable property and valuers/investors to understand how and what sustainable strategies might impact asset value.</p> <p>Using three different case studies, the paper finds that green buildings benefit from enhanced occupancy rates and speed of leasing. However, it finds that in terms of lease terms, the properties were competitive with local comparables.</p> <p>The paper also concludes that “<i>the way in which sustainable attributes translate into value is not simple or direct</i>” and these are reflected differently in valuation methods.</p>
<p><i>Property Bosses Search for Sustainable Evidence</i></p>	<p>Clark, P. Building (23rd October)</p>	<p>Online: http://www.building.co.uk/story.asp?storycode=3098158</p>	<p>2007</p>	<p>A short piece setting out the views of Prupim and Hammerson that there is no link yet between value and sustainability. “<i>Value is not yet seen... it is the biggest block to sustainability</i>”.</p> <p>It argues that proving additional productivity among those who work in green buildings is the “<i>holy grail</i>”. They further argue that it is difficult to engage tenants in requirements for sustainability.</p>
<p><i>Commercial Real Estate and The Environment</i></p>	<p>CoStar Group</p>	<p>Online: http://www.costar.com/uploadedFiles/Partners/CoStar-Green-Study.pdf</p>	<p>2008</p>	<p>A presentation from CoStar Group showing significant US data on the performance of LEED and Energy Star certified buildings compared to non-certified comparable property.</p> <p>The presentation strongly supports the case for rental differentiation and higher occupancy rates in the US for certified buildings and argues that in consequence this feeds through into market value.</p>

<p><i>IPD/IPF Sustainable Property Index (ISPI) UK</i></p>	<p>Cudworth, C. & Graham, R. Launch Presentation, London, 30 June</p>	<p>Online: http://www.ipd.com/portals/1/downloads/products_services/ISPI%20Presentation%2030%20June%202009.pdf</p>	<p>2009</p>	<p>Presentation outlining the main details of the embryonic ISPI including methodology, initial output and future development.</p> <p>No conclusions as to the link between sustainability and investment performance can be drawn from the initial outputs as sustainability features are not yet priced into valuation.</p> <p>The presentation highlights the role of the industry in supplying data to the index and expresses the need for 5 – 7 years of robust data before reliable conclusions can be drawn.</p>
<p><i>Green Buildings: A Behavioural Change</i></p>	<p>Cushman and Wakefield London</p>	<p>Online: http://www.immobiliendurable.eu/images/2128_uploads/Green_Buildings_CS_Jun_.pdf</p>	<p>2008</p>	<p>A report summarising the drivers for change in the property industry. It discusses EPCs and regulatory drivers and voluntary ratings systems such as BREEAM and LEED. It comments that, based on recent surveys by Cushman and Wakefield and others, there is increasing evidence that tenants view sustainability as a determining factor in their property decisions with large companies leading the way. Reference is made to the European Landlord and Tenant survey 2007. It also quotes the Co Star US study showing energy savings, rental premiums, increase in occupancy rates and sales premiums.</p>
<p><i>European Landlord and Tenant Survey 2009</i></p>	<p>Cushman and Wakefield London</p>	<p>Online: http://bpcc.org.pl/images/stories/file/european_landlord-tenant_survey_2009.pdf</p>	<p>2009</p>	<p>This survey report focuses on European landlord and tenant attitudes to occupation of space and environmental issues. 750 landlords and tenants took part. Despite a changing marketplace, 40% of respondents stated that they focus more on sustainability now than a year ago and 39% of tenants and 44% of landlords reported that they would pay a premium to lease or purchase an environmentally friendly building. The majority of respondents expressed a willingness to pay a premium between 1-5%.</p>
<p><i>Sustainable Construction: Whole Life Cost Benefits</i></p>	<p>Cyril Sweett London</p>	<p>Online: http://www.greenspec.co.uk/documents/whitepapers/CyrilSweett.pdf</p>	<p>2006</p>	<p>A commissioned study reviewing the Whole Life Cost case for the inclusion of a range of sustainable building materials and waste, water and energy installations within the residential sector. It provides detailed analysis of many available products and creates a centre for their use; however, it does not seek to evaluate any value implications.</p>

<p><i>The Cost and Benefit of Achieving Green Buildings.</i></p>	<p>Davis Langdon</p>	<p>Online: http://www.davislangdon.com/upload/StaticFiles/AUSNZ%20Publications/Info%20Data/InfoData_Green_Buildings.pdf</p>	<p>2007</p>	<p>An Australian publication reviewing the costs and benefits of refurbishing buildings to Gold Star levels and the differential between bands. The report recognises the increased costs of achieving green buildings but argues the premise that building life is extended, lowering depreciation and refurbishment cost, it acknowledges that direct capital value shift is problematic. It notes that incorporating sustainability in value is stifled by traditional valuation methods and that moving towards life-cycle valuation will improve the situation.</p>
<p><i>Cost of Green Revisited</i></p>	<p>Davis Langdon US</p>	<p>Online: http://www.davislangdon.com/upload/images/publications/USA/The%20Cost%20of%20Green%20Revisited.pdf</p>	<p>2007</p>	<p>A report that re-examines if the cost of incorporating sustainable design features into projects affects cost by comparing projects where a primary goal was to achieve a rating with projects where LEED was not considered during design. The study looks at a total of 221 buildings, 83 of which were designed to meet USGBC LEED certification standards. The sectors covered were academic buildings, laboratories, libraries, community centres and ambulatory care facilities. All projects checklists were measured against LEED NC 2.2. It concludes that many projects are achieving LEED within budgets and in the same cost range as non-LEED; construction costs have risen but projects are still achieving LEED. The idea that green is an added feature continues to be a problem. It also outlines site sustainable site selection/design criteria.</p>
<p><i>Sustainability and the Implication of Property Investment Presentation</i></p>	<p>De Francesco, A. RICS Sydney Conference – Global Property Investment: Prospects and Risk</p>	<p>Online: http://www.cfsgam.com.au/uploadedFiles/CFSGAM/PdfResearch/071031%20Presentation%20Sustainability%20and%20the%20Implications%20for%20property%20investment.pdf</p>	<p>2007</p>	<p>A presentation summarising and outlining the theoretical impacts of sustainability on property investors in Australia. The paper discusses the potential for sustainability to impact upon value through risk parameters and rental level and growth. It also touches on the flip-side of occupiers expecting discounts on non-sustainable stock and the subsequent down-valuing of non-sustainable buildings.</p>

<p><i>The Impact of Sustainability on the Investment Environment: a Case Study of Australia</i></p>	<p>De Francesco, A. & Levy, D. RICS Research</p>	<p>Online: http://www.rics.org/Knowledgezone/Researchandreports/sustainabilityfibre_101108_research.html</p>	<p>2008</p>	<p>A theoretical and technical study detailing the potential effects of sustainability on value and pricing. The paper focuses mainly on an Australian perspective, detailing methods for building sustainability into appraisals via DCF and CAPM (Capital Asset Pricing Mechanism) It concludes that the main reason behind creating a value added case is via 'future proofing' and subsequent impact on discount rates through reduced risk-premia in future. The paper stresses that understanding of the impact of sustainability on real estate values is still developing.</p>
<p><i>Demand for Sustainable Offices in the UK</i></p>	<p>Dixon, T.; Ennis-Reynolds, G.; Roberts, C. & Sims, S. IPF Research</p>	<p>Online: * http://www.ipf.org.uk/MainWebsite/GeneralContent?8ffa20e881efb5fc2ff2cc1eccc3f1d43f0a410.aspx?Map=7646EEA0E098E38DC4E31F880F08109A</p>	<p>2009</p>	<p>A contemporary study determining the extent and nature of occupier demand for sustainable offices within the UK. Through a range of interviews and case studies, the study examined 'actual' moves rather than hypothetical preferences and assesses the extent to which sustainability considerations play a role in final occupational choice. The study finds that, whilst sustainability remains lower than traditional selection criteria such as location and building quality, it has become relatively more important in moves during the previous 12 months. It also presents the most common sustainability features within office buildings. The results also show occupiers do assess the financial case for sustainability in their choice of office but perceived additional costs remained a barrier.</p>
<p><i>Sustainability: A New Form of Risk Depreciation</i></p>	<p>DTZ DTZ Research, London</p>	<p>Online: ** www.dtz.com</p>	<p>2007</p>	<p>A research article discussing the anticipated impacts of sustainability on building value, but focuses unerringly on energy efficiency. Building on the results of a previous, now unavailable study by Gensler (2006), the article considers a range of attributes which will affect value including: <ul style="list-style-type: none"> - Rate of obsolescence - Desirability to occupiers - Differential rental growth It concludes that, despite a lack of empirical evidence at the time, differential rental growth between efficient and inefficient buildings will impact significantly upon yields in the long term.</p>

<i>Does Green Pay?</i>	DTZ DTZ Research, Brussels	Online: http://www.immo-news.net/docs/DoesGreenPay.pdf	2008	<p>A report that discusses the measures being implemented in Belgium to address the requirements set out by European Energy Regulation (Directives 2002/91CE and 2006/32/CE). It also reports the findings from a study carried out by Solvay Business School which looks at the energy performance of green buildings and how this can be linked to profitability.</p> <p>The results show that insulation is key to reducing total cumulative costs of construction and operation but concludes that investors generally require a positive return within a shorter timeframe than that used in the analysis. The report also considers other aspects of sustainability in buildings such as productivity, employee retention, CSR, location, green leases and space planning.</p>
<i>Why all the Fuss?</i>	DTZ DTZ Research Australia and New Zealand	Online: ** http://www.dtz.com/portal/site/global/menuitem.6cf217fb909f49739d37a210da80cb3c/?vgnextoid=1584b0e49b913010VgnVCM10000ae08bcc3RCRD&vgnnextchannel=1584b0e49b913010VgnVCM10000ae08bcc3RCRD&vcmid=9b8740da4a6ec110VgnVCM1000000b01a8c0RCRD	2008	<p>A report which summarises and discusses the use of the building rating systems currently in place in Australia and New Zealand.</p> <p>The researchers conclude that a single rating tool is preferable to having alternatives. The report also looks at three case studies, two of which consider the motivations and drivers of occupiers who align elements of building projects undertaken with other corporate sustainability goals. A third case study looks at a 6 star rated Green Star building which was tenanted. It is estimated that the leasing campaign resulted in an additional 10-15% in rent thanks to the exceptionally high rating.</p>
<i>Green Real Estate</i>	DTZ DTZ Research France	Online: ** http://www.dtz.com/portal/site/UK/menuitem.5517711c756c5d1fcfa4217ea80cb3c/?vgnextoid=6958f61369ba2010VgnVCM1000000ae08bcc3RCRD&vgnnextchannel=6958f61369ba2010VgnVCM1000000ae08bcc3RCRD&vcmid=d3b87b9810410210VgnVCM1000000b01a8c0RCRD	2009	<p>A publication investigating the prevalence of sustainable property in Paris and then by way of a survey of 50 businesses in the Paris region explores the understanding of the regulatory framework surrounding commercial sustainable property and businesses attitudes and intentions towards sustainable buildings.</p> <p>The findings from the survey suggest respondents expect rents in Haute Qualité Environnementale (HQE) qualified buildings to be 5-10% higher and utility costs 10-15% lower. The analysis of presales of rated and non rated buildings show that rated buildings achieve higher levels of value.</p>

<p><i>Doing Well By Doing Good? Green Office Buildings</i></p>	<p>Eichholtz, P.; Kok, N.; & Quigley, J.M. California University of Berkeley: Institute of Business & Economic Research</p>	<p>Online: http://repositories.cdlib.org/cgi/viewcontent.cgi?article=1076&context=iber/bphup</p>	<p>2008</p>	<p>Described by the authors as a “unique body of micro data on economic and hedonic characteristics of offices in the US”, this paper links hard market data with accredited buildings, focussing mainly on energy efficiency.</p> <p>It argues that to date “hard evidence on the financial performance of green buildings is limited and consists mainly of industry-initiated case studies” (p.7).</p> <p>The paper undertakes a regression analysis of rents, effective rents and capital values of green certified and non-green buildings from a significant sample size of over 8000 properties. Analysis was robust and tested for skew. However, the data was spread over three years and although drawn from across US, exact locations are unknown. The paper finds that characteristically, green buildings were newer, taller, bigger and with higher occupancy rates. They also had net leases more frequently. Hedonic analysis carried out to adjust for this. The results suggest a clear rental premium (c.2%) for buildings with a ‘green rating’ which the authors use to suggest that for a typical size building in the sample, value differential is estimated to be about \$5million. This is one of the few transaction based studies available to date.</p>
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<p><i>Doing Well By Doing Green? An Analysis of the Financial Performance of Green Office Buildings in the USA</i></p>	<p>Eichholtz, P.; Kok, N.; & Quigley, J.M. RICS Research, London</p>	<p>Online: http://www.rics.org/Knowledgezone/Researchandreports/doingwell_300309_research.htm</p>	<p>2009</p>	<p>A publication elaborating on the above working paper. A US based study of the value differential of certified (LEED and Energy Star) and non-certified buildings and additionally, what within the label is driving the premium. The sample was drawn from c.900 certified buildings and corresponding non-certified properties within a quarter mile radius, resulting in an overall sample of c.8200. Evidence supported a rental differential for Energy Star certified buildings but no such premium for LEED rated buildings. Findings also showed a premium on the selling price of green buildings but from a much smaller sample. Also, the study concluded that the key driver from within the label was energy efficiency and its associated cost savings.</p>
<p><i>Socially Responsible Property Investment: Quantifying the Relationship Between Sustainability and Investment Property Worth</i></p>	<p>Ellison, L.; Sayce, S. & Smith, J. Journal of Property Research</p>	<p>Online: * http://www.tandf.co.uk/journals/titles/09599916.asp</p>	<p>2007</p>	<p>A study setting out a model framework for how sustainability may impact on investment worth. Based on relatively contemporary figures, the model assumes that energy costs will increase and that policy will become more stringent. The paper gives examples of how regard for sustainability may impact on worth but figures given around 5.6% may vary in accordance with the subjective judgement of criteria importance made by investors.</p>
<p><i>The Sustainable Property Appraisal Project</i></p>	<p>Ellison, L. & Sayce, S. Kingston University</p>	<p>Online: http://www.kingston.ac.uk/fada/docs/SAP.pdf</p>	<p>2006</p>	<p>The Sustainable Property Appraisal Project was an industry-wide research collaboration developing appraisal tools to assess building worth in accordance with triple bottom line principles. It establishes a set of nine sustainability criteria ranging from energy efficiency to building adaptability. The research project concluded that sustainability will impact upon worth through five main conduits: rental growth, depreciation, cashflow, duration to let, and duration to sell. By exploring the quantifiable links between a set of criteria and property worth and translating these into figures, the Sustainable Property Appraisal Project generates the first major attempt to incorporate sustainability principles into worth appraisal.</p>

<p><i>Pricing Sustainability: An Empirical Investigation of the Value Impacts of Green Building Certification</i></p>	<p>Fuerst, F. & McAllister, P. American Real Estate Society Conference, Florida, 16-19 April</p>		<p>2008</p>	<p>A paper presenting a more detailed statistical interpretation of the results of the CoStar study (above), investigating the price differentials between LEED/Energy Star buildings and conventional buildings in the US.</p> <p>By applying hedonic regression analysis the paper provides a robust interpretation of the data.</p> <p>The overall findings suggest observable rental and capital outperformance of LEED certified buildings over conventional buildings. However, it clearly states that to present these results as definitive is inappropriate, citing high volume of owner occupation, and high cash flows into an under-supplied market, leading to an essentially 'hot market' phenomena and providing potential for skewed results.</p>
<p><i>Green Noise or Green Value? Measuring the Price Effects of Environmental Certification in Commercial Buildings</i></p>	<p>Fuerst, F. and McAllister, P.</p>	<p>Online: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1140409</p>	<p>Undated</p>	<p>A working paper which presents the findings from research based on the Co Star data base. Using a hedonic pricing analysis controlled for a number of determinants such as age, occupancy rate, height, size and location, the study confirms price premia for LEED and Energy Star certified buildings. It also states that the evidence points to price premia being larger for buildings with a higher certification.</p>
<p><i>Valuing Low Energy Offices. The Essential Step for Success of The Energy Performance of Buildings Directive</i></p>	<p>Guertler, P.; Kaplan, Z. & Pett, J. ECEEE 2006 Summer Study, Ile-Saint Denis, France</p>	<p>Online: http://www.eceee.org/conference_proceedings/eceee/2005c/Panell_2/2009guertler/</p>	<p>2005</p>	<p>A study which projected the effects of the introduction of the Energy Performance of Buildings Directive (EPBD). Within this, the study attempted to compare, using IPD and energy performance data, energy efficient buildings with conventional peers to see whether any value differential exists.</p> <p>A distinct lack of available data rendered this attempt inconclusive, with the authors adding that energy efficiency is not currently considered in valuation.</p> <p>The study suggested that the advent of the EPBD will initiate market change and that valuers should convey low energy into the market place in order to reflect an emerging market and to help foster it.</p>

<i>Towards Sustainable Offices</i>	GVA Grimley London	Online: http://www.gvagrimsley.co.uk/PreBuilt/Research%20web/Occasional%20Bulletins/Towards_Sustainable_Offices_Apr07.pdf	2007	<p>A report addressing the financial benefits of development and refurbishment of offices to 'green' standards. The report case studies various aspects including occupier demand, initial costs and operational savings to present a case for sustainability.</p> <p>It concludes with a hypothetical study of contrasting investment performance between an office built to BREEM and one built to minimum building regulations, using assumed inputs of how the market 'should' behave.</p>
<i>From Green to Gold: A Unique Insight into Sustainable Investment Attitudes</i>	GVA Grimley London	Online: http://www.gvagrimsley.co.uk/PreBuilt/Knowledge%20Centre/From_Green_To_Gold_Summer_2007.pdf	2007	<p>A report summarising a perception study of sustainability to property investors.</p> <p>It concludes that occupiers are increasingly placing importance on sustainability – and so are investors. However, it further found that only a small proportion of investors (14%) were attaching figures to the costs and benefits of sustainability to property investment appraisals. The report recognises a lack of 'hard evidence' regarding the impact of sustainability on investment performance.</p>
<i>From Green to Gold</i>	GVA Grimley London	Online: ** http://registrations.gvagrimsley.co.uk/subscribeform.aspx	2008	<p>A repeat of a 2007 survey of investor attitudes towards sustainable commercial property investment. Overall the report suggests moderate changes compared with the 2007 survey.</p> <p>The researchers' view is that despite the change in market performance, sustainability remains a concern and it rates in some respects as high, or slightly higher, than in the previous survey. The sustainability agenda is said to have had the biggest impact on offices and business parks. The drivers of change identified include EPCs, the views of occupiers, Corporate Social Responsibility (CSR), the end of the boom and green leases. Energy efficiency is understood to be the most important feature of a sustainable building.</p>

<i>Green Shopping Centres.</i>	GVA Grimley London	Online: http://www.gvagrimley.co.uk/Pre Built/Knowledge%20Centre/05158%20Research%20Green%20Shop ping_April08.pdf	2008	A study exploring the importance of sustainability to the retail sector. A survey of 20 UK shopping centres was carried out in 2008 which assessed the baseline sustainability performance of a property and then rated it against others. It was found that shopping centres tended to perform poorly in energy efficiency, climate control, water management and building management but better in terms of accessibility and waste management.
<i>The Greening of Commercial Leases</i>	Hinnells, M.; Bright, S.; Langley, A.; Woodford, L.; Shiellerup, P. & Bosteels, T. Journal of Property Investment & Finance, 26(6) pp.541-551	Online: * http://info.emeraldinsight.com/pr oducts/journals/journals.htm?PHP SESSID=gmgssobpiu71j1rulq7rnqf 12&id=jpif	2008	A paper discussing the moves towards 'green leases' within the UK property industry and the role of the Landlord and Tenant relationship in promoting sustainable operations. Although the paper does not consider the value of sustainability, the paper provides a very useful discussion on the leasing aspect which will play a key role in sustainable property.
<i>The Requirements of Ethical Fund Managers and Property Investment</i>	Jayne, M. & Skerratt, G. Property Management, 21(2) pp.136-152	Online: * http://info.emeraldinsight.com/pr oducts/journals/journals.htm?id= PM	2003	An early paper examining the opinion of investment managers towards ethical issues regarding property assets. It concluded that, in the long run, ethical criteria should see good long term financial performance and concluded that knowledge of ethical issues is advantageous for property professionals when advising ethical investor clients as they will be likely to impact in the future.
<i>Commercial Property Going Green</i>	Jones Lang LaSalle	Online: http://www.joneslanglasalle.co.uk /ResearchLevel1/JLL_Research_Su stainability_Commercial_Property _Going_Green_AUS_April_04.pdf	2004	An Australian based paper discussing the benefits to property owners of implementing environmental programs. From a range of case studies, the paper finds that buildings operating environmental efficiency programmes (mainly energy, waste and water) can, or do, make significant long term cost savings and benefit from increasing funds from investors.
<i>Future – Proofing New Zealand's Commercial Property for a Sustainable Tomorrow.</i>	Jones Lang LaSalle New Zealand	Online: ** www.joneslanglasalle.com	2006	An explanatory report collating a number of examples in New Zealand where energy efficiency, waste and water conservation measures have been achieved in office developments and/or refurbishments. The report tracks the premium cost attached to 'Green Specification' and calculates the expected payback period, around 10-13 years depending on the level of 'greenness'. Throughout an assumption of owner occupation is made and there is no reference to market values.

<p><i>Assessing the Value of Sustainability</i></p>	<p>Jones Lang LaSalle Australia</p>	<p>Online: http://www.joneslanglasalle.com.au/NR/rdonlyres/1659B752-E030-43EC-BF63-E8E06F9A5A94/0/assessingvalue_whitepaper2006.pdf</p>	<p>2006</p>	<p>A paper outlining the cost effectiveness of sustainability initiatives and discussing the potential to increase building performance and property values.</p> <p>Taking an Australian perspective, the paper discusses government leadership on sustainability and the impacts on property markets.</p> <p>The publication concludes that the focus on a 'sustainability premium' will shift to a 'non-sustainability discount' over the coming years and suggests that investors should consider paying a premium for sustainable assets.</p>
<p><i>Sustainability: Bridging the Knowledge Gap</i></p>	<p>Jones Lang LaSalle Sydney</p>	<p>Online: ** www.joneslanglasalle.com</p>	<p>2007</p>	<p>A short article considering the impact of a skills and knowledge shortage on achieving sustainable real estate in Australia.</p> <p>It notes that environmental performance rating tools have the potential to facilitate improved understanding and knowledge of sustainability and drive market change.</p>
<p><i>Global Trends in Sustainable Real Estate</i></p>	<p>Jones Lang LaSalle London</p>	<p>Online: http://www.joneslanglasalle.com/Pages/ResearchDetails.aspx?TopicName=&ItemID=985&ResearchTitle=Global%20Trends%20in%20Sustainable%20Real%20Estate:%20An%20Occupiers%20Perspective</p>	<p>2008</p>	<p>A report presenting the results of a global survey of 400 corporate occupiers to assess awareness, perceptions and demand of sustainable real estate.</p> <p>The results find that for the majority, sustainability is already a critical concern for real estate and that it presents a major opportunity as opposed to threat. It further finds a willingness to pay up to 10% more but still a fair proportion would not expect to pay any more. The report concludes that the survey illustrates a perception that although there may be some premium, a discount for unsustainable buildings is seen as more probable.</p> <p>Availability was also seen as limited, with only certain areas offering 'good' availability.</p>

<p><i>Building Energy Ratings: Ready to Take Stock?</i></p>	<p>Jones Lang LaSalle London</p>	<p>Online: ** www.joneslanglasalle.com</p>	<p>2008</p>	<p>An opinion piece drawing on literature and survey results examining the possible effects of building energy ratings (BER) on property assets. The article recognises that the BER system could create a value differential and potentially a two-tier commercial market. However it states that assessing this value impact will require significant data and benchmarking.</p>
<p><i>Sustainability: The Measurement and Reporting Challenge</i></p>	<p>Jones Lang LaSalle London</p>	<p>Online: ** www.joneslanglasalle.com</p>	<p>2008</p>	<p>A paper exploring the way in which sustainability is reported to stakeholders and examining challenges facing Australian companies.</p> <p>The report highlights the need for more robust and auditable data on sustainability reporting regarding property. It presents a new, more flexible model for data collection and reporting to allow comparison of property level performance. Although not explicitly stated, the data would provide useful metrics that could be integrated into valuation.</p>
<p><i>Sustaining Value</i></p>	<p>Jones Lang LaSalle London</p>	<p>Online: http://www.joneslanglasalle.com/ResearchLevel1/JLL_Sustaining_Value_May_2008.pdf</p>	<p>2008</p>	<p>A paper discussing property performance in light of market correction and what it defines as a structural shift from the "old market" to the new one, characterised by: costly energy, constrained mobility and evaluating within a social and environmental context.</p> <p>The paper suggests that, as the value focus moves back to income not yield, occupier demand and management costs will impact on value. It adds that sustainability presents a new risk dimension to property and this, combined with increased obsolescence, will feed through to property markets and values, but the question will be how and by how much?</p> <p>The paper also notes 'no evidence of premium yields being paid for sustainable buildings'.</p>

<i>Sustainability: A Guide for the Corporate Real Estate Executive</i>	Jones Lang Lasalle	Online: ** http://www2.corenetglobal.org/dotCMS/kcoAsset?assetNode=5611953	2008	This brief publication outlines the steps essential to develop and implement a sustainability programme for an occupational portfolio. It supports the idea that organisations will gain from reduced environmental footprint, lower operating costs and an enhanced corporate image.
<i>Perspectives on Sustainability</i>	Jones Lang LaSalle Australia and Asia Pacific	Online: ** http://www2.corenetglobal.org/dotCMS/kcoAsset?assetNode=4742313	2009	A short analysis of market sentiment towards sustainability prepared in Australia. It concludes that, although sustainability has moved down the agenda, the commitment shown by many parties gives reason to believe sustainability initiatives will survive the tough economic times.
<i>Global Trends in Sustainable Real Estate: an Occupiers Perspective</i>	Jones Lang Lasalle and Corenet Global US	Online: ** http://www.joneslanglasalle.com/csr/SiteCollectionDocuments/Glob al_Sustainability_Feb08.pdf	2008	A paper based on a survey of 400 occupiers globally. It reports that sustainability is now firmly on the agenda of businesses and identifies 2007 as a tipping point in corporate attitudes. The trend was forecast to continue.
<i>Perspectives on Sustainability</i>	Jones Lang Lasalle and Corenet Global US	Online: ** http://www2.corenetglobal.org/dotCMS/kcoAsset?assetNode=4742313	2008	A short report on the findings of the 2008 survey of occupiers globally. It reconfirms a strong focus on sustainability and that the poor economic climate has not deterred Corporate Real Estate (CRE) executives from embracing and pursuing strategies that produce results. They are however less willing to pay extra for sustainable properties than was suggested in a survey the previous year. The implementation of sustainability aims are seen, with those that cost little but make employers feel engaged, being the most popular.
<i>Green Building Costs and Financial Benefits</i>	Kats, G. Massachusetts Technology Collaborative	Online: http://www.cap-e.com/ewebeditpro/items/O59F3481.pdf	2003	A study based on a cost-benefit analysis of green buildings. The study balances the increased construction costs with lower operating costs and health and productivity benefits, which it claims are widely undervalued in decision-making, deriving a clear conclusion that building green makes financial sense today. Although backed by some LEED data, the report recognises there is 'no right answer' due to the potentially large range of values attributable to productivity and health benefits. Further to this, it recognises a lack of data and the need for further research.

<i>Green Building Returns Outweighs Costs</i>	Katz, A.	Online: http://www.sustainablefacility.com/Articles/Article_Rotation/BNP_GUID_9-5-2006_A_1000000000000367818	2008	An article reviewing other studies (in particular CoStar research) to support the contention in the title. It finds that green building can require “no additional costs”, can yield significant operational savings, achieve greater rents and occupancy rates (CoStar) and offer significant productivity benefits (Fisk)
<i>What About Demand? Do Investors Want ‘Sustainable Buildings’?</i>	Keeping, M. Cutting Edge 2000: RICS Research Foundation, Oxford	Online: http://www.rics.org/Newsroom/Researchandreports/Researcharchive/what_about_the_demand_20000101.htm	2002	A paper considering the reasons behind demand; or at least lack of, from institutional investors for sustainable buildings. The paper concluded that, despite considerable interest in sustainability, the circle of blame plays a role in inhibiting demand. Investors see desirability for their premises as driven by functionality and occupiers fail to see sustainability as an issue of functionality, ultimately giving little evidence of need or demand for sustainable buildings.
<i>Theoretical Foundations for Integrating Sustainability in Property Investment Appraisal</i>	Kimmet, P. 12 th PRRES Conference Paper, Auckland, 22-25 January 2006	Online: http://www.prres.net/Papers/Kimmet_Integrating_Sustainability_Property_Investment_Appraisal.pdf	2006	A theoretical piece arguing that sustainable property provides an element of ‘psychic income’ (positive feeling induced by ownership) and that this should form a vital component of investment pricing and valuation. However, the paper acknowledges that at this time it does not.
<i>Central London Occupier Survey Analysis</i>	Knight Frank London	Online: * http://www.driversjonas.com/uk.aspx?doc=28771	2008	A study examining occupier trends within the Central London Office market (City, West End & Docklands). The study found that, despite growing awareness of the issue and the introduction of regulation, energy efficiency was of low importance in the decision to acquire new space against traditional criteria such as rental cost and lease flexibility, suggesting that sustainability remains a luxury rather than a “must have”. It further found that green/sustainable issues were actually seen as a limiting factor about locating in Central London.

<p><i>Green Gains: Where Sustainable Design Stands Now</i></p>	<p>Kozlowski, D. Building Operating Management, 50(7), pp.26-32</p>	<p>Online: http://findarticles.com/p/articles/mi_qa3922/is_200307/ai_n9267593/pg_6/?tag=content;col1</p>	<p>2003</p>	<p>An early paper exploring attitudes towards green buildings which begins to make a case that raising awareness of “green” and measures such as LEED will begin to create change. The paper reiterates the lack of transactional data, commenting that the ‘jury is still out’ on market value. The paper also highlights the difficulty in affixing hard numbers to some of the less tangible benefits of ‘green’ buildings.</p>
<p><i>The Influence of Trees & Landscapes on Rental Rates at Office Buildings</i></p>	<p>Laverne, R.J. & Winson–Geideiman, K. Journal of Arboriculture, 29(5)</p>	<p>Online: http://www.treelink.org/joa/2003/sep/04Laverne.pdf</p>	<p>2003</p>	<p>An early article examining the impact of landscaping on rental rates of office buildings in the US. Through the use of multiple regression analysis it sought to find whether the presence of trees and plants around offices had an impact on retail value. From a sample of 85 buildings (nearly 300 Lease contracts) it finds a significant positive relationship except when the trees were close to buildings and screened them from view. In these cases a value reduction was found.</p>
<p><i>Sustainability in Property Valuation- Theory and Practice</i></p>	<p>Lorenz, D. & Lützkendorf, T. Journal of Property Investment & Finance, 26(6), pp.482-521</p>	<p>Online: * http://info.emeraldinsight.com/products/journals/journals.htm?PHPSESSID=gmgssobpiu71j1rulq7rnqf12&id=jpif</p>	<p>2008</p>	<p>A paper explaining the rationale for integrating sustainability issues into property valuation theory and practice. It tackles the issues from two angles; market value and worth; finding that it may be possible to account for a much wider range of sustainability issues in calculations of worth. It recognises two major difficulties in establishing a quantifiable link between sustainability and value; paucity of comparables and identification of physical characteristics contribution. It suggests that valuers can reflect sustainability within value but adjustments to capitalisation/discount rates will be subjective and highly uncertain.</p>
<p><i>Next Generation Decision Support Instruments for the Property Industry – Understanding the Financial Implications of Sustainable Buildings</i></p>	<p>Lorenz, D. & Lützkendorf, T. World Sustainable Building Conference, Melbourne, 21-25 September</p>	<p>Online: http://www.property-advisors.de/research-conferences.html</p>	<p>2008</p>	<p>An article investigating the basis of improved decision support in the future of sustainable property. The author states that without a fundamental change in how we value our built environment, the mainstreaming of sustainable development in property will be severely hampered.</p>

<p><i>The Case of Transaction Data – Availability and Scope</i></p>	<p>Lorenz, D. & Lützkendorf, T. RICS EU Advisory Group on Sustainable Property Investment and Management Meeting, Brussels, 7 March</p>		<p>2008</p>	<p>A presentation based on a survey of German valuation expert committees. It examines the coverage of building information in transactional databases and questions how this could be extended/improved to facilitate valuations which incorporate sustainability. It highlights a prevailing 'conservative' approach and suggests that because useful information does not feed into property databases directly, analysing the price of sustainability is greatly restricted.</p>
<p><i>Special Consideration in the Valuation of Sustainable Properties.</i></p>	<p>Lowe, T. & Chappell, T. PREA Quarterly, Summer (pp.38-44)</p>	<p>Online: * www.prea.org</p>	<p>2007</p>	<p>A short opinion piece suggesting the need for practitioners to further understand the impacts of sustainability features in property moving forward. It highlights that sustainability features will refocus valuers' minds onto operational performance as opposed to financial performance.</p> <p>It concludes that 'in the absence of transactional data, valuers will have to undertake thorough property analyses and informed judgement when deriving value.</p>
<p><i>A Business Case for Green Buildings in Canada</i></p>	<p>Luciuk, M.; Trusty, W.; Larsson, N. & Charette, R. Morrison Hershfield</p>	<p>Online: http://www.cagbc.org/uploads/A%20Business%20Case%20for%20Green%20Bldgs%20in%20Canada.pdf</p>	<p>2005</p>	<p>A Canadian report presenting numerous benefits of green buildings also highlighting the misunderstandings surrounding this type of building in the form of a lack of knowledge and awareness of the benefits.</p> <p>It recognises the lack of studies on the relationship between property values and green buildings, but highlights factors that in theory should lead to a value increase including: intelligent features, organisational commitment (Canadian Government), lower operating expenses and media attention. Other benefits include increased retail sales, improved image, risk reduction (future proofing and litigation mitigation).</p>

<p><i>Sustainable Property Investment: Valuing Sustainable Buildings through Property Performance Assessment</i></p>	<p>Lützkendorf, T. & Lorenz, D. Building Research and Information 33(3), pp212-234</p>	<p>Online: * http://www.tandf.co.uk/journals/titles/09613218.asp</p>	<p>2005</p>	<p>A paper presenting potential reasoning and methodology for integrating sustainability into property valuation. It considers the way in which sustainability features of property may impact on value and worth, but recognises that an agreed set of sustainability Key Performance Indicators (KPI) and databases for sustainable building performance. It discusses the use of hedonic pricing to bring some 'science' to property valuation and suggests that whilst valuers can reflect sustainability in valuations, without the support of market evidence such valuations may be brought into question.</p>
<p><i>Costing Green: A Comprehensive Cost Database and Budgeting Methodology</i></p>	<p>Matthiessen, L.F. & Morris, P. Davis Langdon</p>	<p>Online: http://www.davislangdon.com/upload/images/publications/USA/2004%20Costing%20Green%20Comprehensive%20Cost%20Database.pdf</p>	<p>2004</p>	<p>A report which compares the cost of green buildings within the UK with the cost of comparable building programmes which do not have sustainability goals. It concludes that many projects achieve sustainable design within budget or with only a small supplemental funding. The report also considers the feasibility of achieving credits under each LEED point in projects. The analysis is based on a comparison of academic buildings, laboratories and libraries in the UK.</p>
<p><i>Cost of Green Revisited</i></p>	<p>Matthiessen, L.F & Morris, P. Davis Langdon</p>	<p>Online: http://www.davislangdon.com/USA/Research/ResearchFinder/2007-The-Cost-of-Green-Revisited/</p>	<p>2007</p>	<p>An update of a UK 2004 study examining the cost of incorporating sustainable design features into projects. Using a range of case studies, the paper finds support for the 2004 conclusion that "there is no significant difference in average cost for green buildings as compared to non-green buildings".</p>
<p><i>Will Greener Buildings Bring Bigger Profits?</i></p>	<p>McNamara, P. Professional Investor, Autumn, pp.41-43</p>	<p>Online: http://www.prupim.com/site/media/documents/3186_Will_greener_buildings_bring_bigger_profits.pdf</p>	<p>2008</p>	<p>A short theoretical piece arguing that, as and when occupiers exercise sustainability preference, so growth rates will differentiate and risk premia will increase for unsustainable stock. It further argues that the scale of impact sustainability has on property values will be determined by "how much tenants and investors...care about these issues". It presents an argument for 'should and will' – not 'is and now'.</p>

<p><i>Green Property: Does it Pay?</i></p>	<p>Merrill Lynch Australia</p>	<p>Online: http://www.unepfi.org/fileadmin/documents/materiality2/property_merrill_lynch_2005.pdf</p>	<p>2005</p>	<p>A report prepared for the UN based on data collected from Listed Property Trusts. It explores the possible revenue lines linked to sustainability and finds that key to office performance are tenant retention, cost savings and employee productivity although it acknowledges the latter is difficult to measure. For retail property the benefits are less clear cut although, it is suggested that it is linked to the success of a centre as a meeting place and in choice of finishes. It considers overall design to be important. For industrial property natural ventilation, light panels and location close to road links are important. It concludes that the LPT sector is happy to be green or sustainable if it adds to the bottom line, this is thought to happen through improved reputation, enhanced income, lower costs, lower risks and an increased investor base.</p>
<p><i>Does Green Pay Off?</i></p>	<p>Miller, N.; Spivey, J. & Florance, A.</p>	<p>Online: http://catalogue.polytechnique.fr/site.php?id=161&fileid=893</p>	<p>2008</p>	<p>A paper which presents a resume of data from Energy Star rated buildings in the US. It argues that occupancy, rental rates and sale price per sq ft are higher – and that over the period of 2005-2007 these differentials increased. However, the paper recognises that the results are preliminary in nature and that most of the benefits of ‘green’ buildings may not yet show up in higher base rents.</p>
<p><i>The Value of Environmental and Social Issue to Real Estate Investors</i></p>	<p>Mistra Stockholm</p>	<p>Online: http://www.stockholmresilience.org/download/18.39aa239f11a8dd8de6b800026483/Report+from+Mistra+Real+Estate+seminar.pdf</p>	<p>2008</p>	<p>A summary of outcomes from a workshop where participants shared what they are doing/have found out. The workshop found that participants considered that the benefits and costs of resource efficiency are not evenly shared between actors. It also recognised that occupant comfort and brand/reputation will drive values as much as efficiency. It identifies that investors should look towards existing stock that can be value added as opposed to new builds which are “rare” and for which the ‘green premium’ may already be priced in.</p>

<p><i>Business Case for Green Design</i></p>	<p>Morton, S. Building Operating Management, November</p>	<p>Online: http://www.facilitiesnet.com/bom/Nov02/Nov02environment.shtml</p>	<p>2002</p>	<p>An early paper considering the case for green design based on the fact that initial building cost superficially represents 10% of the life cycle cost of a building. As a result it suggests that improved operating costs and opportunity costs in the form of employee productivity, are the main drivers behind the enhance value argument.</p>
<p><i>Quantifying "Green" Value: Assessing the Applicability of the Co-Star Studies</i></p>	<p>Muldavin, S. Green Building Finance Consortium</p>	<p>Online: www.greenbuildingfc.com/Home/ViewResearchDoc.aspx?id=34</p>	<p>2008</p>	<p>A paper providing a critique of the US Co-Star study. Whilst not rejecting the fundamental findings of the original study, the author questions the reliability and communication of some of the results. In particular, the paper highlights that the results may only be applicable to strategic decisions not individual property decisions. It also suggests that issues with finding truly comparable peers impact upon the reliability of the study.</p>
<p><i>Investor Perception of The Business Case for Sustainable Office Buildings: Evidence from New Zealand</i></p>	<p>Myer, G.; Reed, R. & Robinson, J. 14th PRRES Conference Paper, Kuala Lumpur, 20-23 January</p>	<p>Online: http://www.prres.net/papers/Myers_Investor_Perception_Of_The_Business_Case.pdf</p>	<p>2008</p>	<p>A paper from New Zealand which investigates the relationship between market value and the impact of sustainable attributes in commercial office buildings. It reports in particular on the findings of an investigation into market perception towards sustainable buildings, mainly via an investor/developer survey in New Zealand. The survey found that 58% would pay more for sustainable property; however, traditional factors such as location would still determine whether a property was purchased, suggesting that sustainability will continue to take a back seat. Overall the perception of respondents, both investors & developers, was that sustainable buildings will play an important role in property portfolios in the future. However, the lack of a firm financial case was stifling uptake and investment in sustainable buildings.</p>

<p><i>The Relationship Between Sustainability and the Value of Office Buildings</i></p>	<p>Myers, G.; Reed, R. & Robinson, J. 13th PRRES Conference Paper, Perth, 21-24 January</p>	<p>Online: http://www.pres.net/papers/Myers_Reed_Robinson_The_Relationship_Between_Sustainability.pdf</p>	<p>2007</p>	<p>This paper comprises a literature review of published material investigating the link between sustainability and property value.</p> <p>The paper considers a range of issues including:</p> <ul style="list-style-type: none"> - Synthesising the range of ways purported by other literature that sustainability can potentially increase value; and - Identification of methods for evaluating the impact of sustainability on market value, including DCF and hedonic pricing. <p>It concludes that a lack of market data remains the barrier to consensus on how impact can be accurately measured and quantified.</p>
<p><i>Implementation of Sustainable Commercial Property Practices by European Property Companies.</i></p>	<p>Newell, G. European Real Estate Society Conference, Krakow, 18-21 June 2008</p>		<p>2008</p>	<p>A presentation discussing the initiatives and strategies used to implement sustainable commercial property practices by European property companies.</p>
<p><i>The Role of Property in Ethical Managed Funds</i></p>	<p>Newell, G. & Acheampong, P. 8th PRRES Conference Paper, Christchurch, 21-23 January</p>	<p>Online: http://www.pres.net/Papers/Newell_The_role_of_property_in_ethical_managed_funds.pdf</p>	<p>2002</p>	<p>An early article that foresees the increasing significance of property in ethical funds.</p>
<p><i>Evolutionary Tendencies in Real Estate</i></p>	<p>Parnell, P. Estates Gazette (12th May)</p>	<p>Online: * www.egi.co.uk</p>	<p>2007</p>	<p>An article i which states that, whilst the tipping point in terms of sustainability being a transactional issue has not been reached, there is a strong sentiment towards government initiatives paving the way for this to happen. It highlights the following as possible ways for the UK Government to incentivise the market: a discount in rates, widening the scope of capital allowances, lower VAT and Stamp Duty Land Tax exemption.</p>

<p><i>Sustainability – A Valuer's Perspective</i></p>	<p>Parnell, P. Drivers Jonas</p>	<p>Online: http://www.rics.org/NR/rdonlyres/ABFE4385-9E11-4989-ABCO-2E7783506C68/0/PhilipParnell.pdf</p>	<p>2008</p>	<p>A presentation emphasising the role of real estate in the Corporate Social Responsibility (CSR) jigsaw. Specifically, the presentation notes that future risk will affect the value of 'green' and 'non-green' assets and suggests that, as many sustainability attributes are not reflected in valuation, property assets are mis-priced.</p>
<p><i>A Comparison of Occupant Comfort and Satisfaction Between a Green Building and a Conventional Building</i></p>	<p>Paul, W.L. & Taylor, P.A. Building and Environment, Vol43, pp.1858-1870</p>	<p>Online: * http://www.elsevier.com/wps/find/journaldescription.cws_home/296/description#description</p>	<p>2008</p>	<p>An Australian study of 3 University buildings surveying user concerns and levels of satisfaction with a green building, primarily designed for low energy use, against two conventional buildings. A statistical analysis of user views across a range of comfort and satisfaction criteria found no significant difference in performance between the types of building.</p>
<p><i>Marketing Green Buildings to Tenants of Leased Properties</i></p>	<p>Persram, S.; Lucuik, M. & Larsson, N. Canada Green Building Council</p>	<p>Online: http://www.cagbc.org/database/rite/Marketing%20Green%20Buildings%20to%20Tenants.pdf</p>	<p>2007</p>	<p>A Canadian paper highlighting a full range of occupational/ business benefits of green buildings. Although not considering the issue of value, the paper presents a range of reasons why tenants should seek to occupy green space.</p>
<p><i>Is there a Future for Socially Responsible Property Investment?</i></p>	<p>Pivo, G. Real Estate Issues, Fall 2005, pp.16-26</p>	<p>Online: http://www.u.arizona.edu/~gpivo/Is%20there%20a%20future%20for%20SRPI.pdf</p>	<p>2005</p>	<p>A paper considering the potential for a niche in Socially Responsible Property Investment (SRPI), as in the US, Socially Responsible Property Investment products are hard to find or non-existent. It considers the lack of a formal screening process for property and suggests that work to create a mechanism which gives investors the option of investing in certified stock is needed. It recognises that the link between value and the social and environmental performance of buildings is, as yet, unproven but draws from other studies including National Council of Real Estate Fiduciaries (2003)) to report that centrally located offices which benefit from prudent land use, less independent car use and higher density, have a higher return when compared with suburban properties. It cites that land use, density, mixed use housing and the fact that amenities are within walking distance have a positive impact on customer demand, their willingness to pay and developers' return.</p>

<p><i>Exploring Responsible Property Investing: A Survey of American Executives</i></p>	<p>Pivo, G. Corporate Social Responsibility & Environmental Management</p>	<p>Online: Full Version: http://www.u.arizona.edu/~gpivo/Pivo%20CSREM.pdf Short Version: http://www.u.arizona.edu/~gpivo/RPI%20Survey%20Brief.pdf</p>	<p>2007</p>	<p>A paper presenting the results of a survey of American property investment organisations regarding Responsible Property Investment (RPI) practices.</p> <p>The survey examines the extent to which Responsible Property Investment (RPI) practices are embedded in US property organisations. The paper finds that business concerns lead the list of barriers with insufficient financial performance the foremost, closely followed by a lack of tenant demand, market scarcity and a lack of information.</p> <p>Further, it finds that, for further investment, Responsible Property Investment (RPI) would need to meet risk/return criteria, suggesting that the business case remains unsubstantiated.</p>
<p><i>Responsible Property Investment Criteria Developed using the Delphi Method</i></p>	<p>Pivo, G. Building Research and Information, 36(1), pp.20-36</p>	<p>Online: * http://www.tandf.co.uk/journals/titles/09613218.asp</p>	<p>2008</p>	<p>An international study conducted in order to ascertain the criteria of socially responsible property investment. Representatives from the real estate and social investing sectors were asked to rank 66 criteria in terms of materiality to investors and importance to the public interest.</p> <p>A moderate to strong level of consensus was achieved with energy efficiency and conservation being singled out as the most important criteria, followed by the availability of a high level of public transport services and central location. The paper does not consider the link between these criteria and value.</p>
<p><i>Responsible Property Investing</i></p>	<p>Pivo, G. & McNamara, P. International Real Estate Review, 8(1), p.128-143</p>	<p>Online: http://www.u.arizona.edu/~gpivo/Pivo-Mcnamara(128-143).pdf</p>	<p>2005</p>	<p>A paper presenting the case for Responsible Property Investment (RPI) on the basis of a "second return" to an investor through increased tenant productivity or community gains.</p> <p>The paper highlights existing 'best practices' employed by companies within the area. The authors note that a lack of evidence means that real estate investors perceive that investing responsibly results in higher costs with no immediate increase in asset value.</p>

<p><i>Socially Responsible Property Investment (SRPI:) An Analysis of the Relationship Between SRI and UK Property Investment Activities</i></p>	<p>Rapson, D.; Shiers, D.; Roberts; C. & Keeping, M. Journal of Property Investment & Finance, 25(4), pp.342-358</p>	<p>Online: * http://www.tandf.co.uk/journals/titles/09613218.asp</p>	<p>2007</p>	<p>An article based on the investigation of ten top fund managers in the UK seeking to understand common activities, industry application and market leading innovations linked to SRI. It explores the relationship between Socially Responsible Investment (SRI) and Socially Responsible Property Investment (SRPI). The authors expect engagement with SRPI principles to rise as companies will avoid holding bad (non green/sustainable) buildings which are considered difficult to let or sell and which will subsequently depreciate in value.</p>
<p><i>The Increasing Importance of Sustainability for Building Ownership.</i></p>	<p>Reed, R.G. & Wilkinson, S. Journal of Corporate Real Estate, 7(4), pp.339-350</p>	<p>Online: * http://info.emeraldinsight.com/products/journals/journals.htm?id=JCRE</p>	<p>2005</p>	<p>A paper investigating the incorporation of energy efficiency into built environments. It states that so far there is no evidence that premium is paid for energy efficient buildings and further notes that the additional premium a tenant would be willing pay would be small in comparison to the cost of implementing energy saving features. It concludes that moving forward the investment case rests on reduced risk and depreciation.</p>
<p><i>Encouraging the Uptake of Sustainable Buildings & The Critical Role of the Property Valuers</i></p>	<p>Reed, R.G. & Wilkinson, S. Sustainable Buildings Conference, Melbourne</p>	<p>Online: http://www.rics.org/NR/rdonlyres/FDA109F9-40F6-4E8D-859F-580C03D48331/0/role_of_the_property_valuer_RReed.pdf</p>	<p>2008</p>	<p>A theoretical paper exploring the critical role of valuers in shaping and changing property markets. The paper discusses a range of drivers and barriers to incorporating sustainability considerations into valuations. The paper attempts to quantify the links between sustainability and value, modelling the impact of sustainability aspects on valuation using DCF methods.</p>
<p><i>The Greening of US Investment Real Estate – Market Fundamentals, Prospects and Opportunities</i></p>	<p>RREEF US</p>	<p>Online: https://www.rreef.com/GLO_en/b_in/SO_57_Greening_of_US_Investment_RE.pdf</p>	<p>2007</p>	<p>A paper that explores the drivers for sustainability in the US real estate market. It argues that the tipping point for sustainability to be embraced may be close in some US sub-markets, especially within some product classes such as downtown offices.</p>

<p><i>Green Value: Green Buildings, Growing Assets</i></p>	<p>RICS Research</p>	<p>Online: http://www.bluewildernessgroup.com/index.php?action=display&cat=43&doc=greenvaluesreport_1.pdf</p>	<p>2005</p>	<p>A groundbreaking report seen as the first senior “attempt to think value and ‘green’ empirically”.</p> <p>Through a detailed literature review and a range of case studies, the paper concludes that sustainable features can add value to real estate, both through direct (e.g. investment yields) and indirect (e.g. workplace productivity) measures. It also formulates a set of recommendations for market participants.</p> <p>However, the findings related to only 15 developments spread across 3 countries (U.K, Canada and U.S) and of these only 5 were investment buildings and 9 were non-commercial (residential or educational). Also, the claims of increased capital value were based on valuation not transactional evidence.</p>
<p><i>Financing and Valuing Sustainable Property: We Need to Talk: FIBRE</i></p>	<p>RICS Research London</p>	<p>Online: http://www.rics.org/NR/rdonlyres/1EDE0184-6DBD-4A02-B007-72645B5189B4/0/38488FIBREdraft4.pdf</p>	<p>2007</p>	<p>A paper summarising a conference which brought authors from four papers together from UK, USA & Germany to rethink sustainable property. The RICS sponsored conference addressed the financing, development and valuation of sustainable buildings. It identifies the need to demonstrate & determine how value is added, suggesting that sustainability issues should be included in property rating systems to allow for better risk understanding of risk factors. By doing this, the paper suggests that it would provide evidence for more favourable credit conditions.</p>
<p><i>Property Valuation and Analysis Applied to Environmentally Sustainable Development</i></p>	<p>Robinson, J. 11th PRRES Conference Paper, Melbourne, 23-27 January</p>	<p>Online: http://www.prrs.net/Papers/Robinson_Property-Valuation_Of_Esd.Pdf</p>	<p>2005</p>	<p>A study employing the residual method of valuation to compare two hypothetical properties, one conventional and one with ESD features. The overall findings reveal that ESD features in buildings can generate significantly higher values.</p>
<p><i>The Business Case for Green Buildings</i></p>	<p>Rose, J. Urban Land, ULI, June</p>	<p>Online: http://www.353nclark.com/documents/The_Business_Case_for_Green_Building.pdf</p>	<p>2005</p>	<p>A short opinion piece arguing that building green has significant financial benefits, in both the residential and commercial sectors.</p> <p>In forming its view, the author draws on other reports, such as CSBTF (2003) & Turner Construction.</p>

<i>Green Figures</i>	Russell, J. Estates Gazette, 26 January	Online: * www.egi.co.uk	2008	An article comprising a short commentary on the justification for KPMG's "green" development at Canary Wharf. It examines the specification of the building and concludes that the claim financial case is as yet opaque until the development is complete. A paper beginning to explore a range of sustainability criteria not normally built into property investment appraisals – but which, the paper argues, are likely to influence performance measurement. The paper attempts to establish how selected sustainability criteria impact upon worth from both an investor and occupier perspective.
<i>Integrating Sustainability into the Appraisal of Property Worth: Identifying Appropriate Indicators of Sustainability</i>	Sayce, S. & Ellison, L. The American Real Estate and Urban Economics Association Conference, Skye, Scotland, 21-23 August 2003	Online: http://www.sustainableproperty.ac.uk/Ellison-Sayce-Skye2003.pdf	2003	A paper further developing the criteria within the Sustainable Property Appraisal Project and assessing the potential impact on financial performance and value. It highlights the need to reflect these criteria and more importantly, their effects, within the in appraisal process. It concludes a lack of understanding in the area is an obstacle to a positive industry response.
<i>Assessing Sustainability in the Existing commercial Property Stock.</i>	Sayce, S. & Ellison, L. Property Management, 25(3) pp.287-304	Online: * http://info.emeraldinsight.com/products/journals/journals.htm?id=PM%20#	2007	A paper considering, within the UK context, the progress made to date in terms of developing a culture of sustainability in UK property investment. The paper highlights a range of legislative and market-led drivers including: future downside risk, changing lease patterns and potential enhanced return. It concludes in the light of these drivers and of professional opinion, that despite "significant progress" the market still does not recognise the impact of sustainability in its pricing structure. It further suggests that currently the rationale can only be made on a risk reduction rather than return enhancement case. The paper welcomes the use of fiscal incentives to drive market change..
<i>Understanding Investment Drivers for UK Sustainable Property</i>	Sayce, S.; Ellison, L. & Parnell, P. Building Research & Information, 35(6), pp.629-643	Online: * http://www.tandf.co.uk/journals/titles/09613218.asp	2007	

<p><i>Incorporating Sustainability in Commercial Property Appraisal. Evidence from the UK</i></p>	<p>Sayce, S.; Ellison, L. & Smith, J. 11th European Real Estate Society Conference, Milan, 2-4 June 2004</p>	<p>Online: http://www.sustainableproperty.ac.uk/Ellison-Sayce-Smith-ERESPaper2004.pdf</p>	<p>2004</p>	<p>An early paper written as part of the Sustainable property Appraisal Project. It explores the case for investors to include specific sustainability considerations with the appraisals in order to better assess the future likely financial performance of investment stock as the market develops and determines these buildings which display sustainable features from those that do not.</p>
<p><i>Review of the UK Corporate Real Estate Market with Regard to Availability of Environmentally and Socially Responsible Office Buildings</i></p>	<p>St. Lawrence, S. Journal of Corporate Real Estate, 6(2), pp.149-161</p>	<p>Online: * http://info.emeraldinsight.com/products/journals/journals.htm?id=JCRE</p>	<p>2004</p>	<p>An article presenting the findings of a review of stakeholders into the perceived paucity of appropriate building stock to meet the needs of sustainability aware occupiers. Through a case study and stakeholder interviews the article finds that;</p> <ul style="list-style-type: none"> - “<i>property value is a victim of the marketplace</i>” – it is the institutional investors, who provide substantial funding, that decide the value of buildings, and their mindset is difficult to change; - Following a staunchly sustainable property agenda may place companies in an exploitable position because of supply and demand, suggesting that perceived premiums are borne from scarcity not intrinsic greater value
<p><i>The Impact on Value</i></p>	<p>Strathon, C. RICS Commercial Property Journal, November/December</p>	<p>Online: * http://www.rics.org/NR/rdonlyres/99FD615C-700C-43BC-B899-36CD99209EF/0/Comm_NovDec_07_road.pdf</p>	<p>2007</p>	<p>An opinion piece outlining the main drivers for demand for sustainable property. It concludes that there is no evidence that premium rents or yields are being paid for sustainable property. However, the future concerns about increased obsolescence brought about by meeting green requirements, voids and lack of tenant demand will make investment in sustainable property more attractive in the future.</p>
<p><i>Employee Productivity in a Sustainable Building. Pre- and Post Occupancy Studies in 500 Collins Street</i></p>	<p>Sustainability Victoria and Kador Group</p>	<p>Online: http://www.resourcesmart.vic.gov.au/documents/500_Collins_Productivity_Study.pdf</p>	<p>Undated</p>	<p>A report based on staff surveys within two companies that relocated to a 5 Green Star rated building in Victoria, Australia. The findings from this study report a positive impact on staff productivity and satisfaction from the move.</p>

<p><i>Risk, Reputation and Reward</i></p>	<p>Sustainable Construction Task Group BRE, Watford</p>	<p>Online: http://projects.bre.co.uk/rrr/RRR.pdf</p>	<p>2000</p>	<p>A very early report upon which many later publications are founded. It outlined the business case for sustainable construction and property and was perhaps the first that sought not to build such a case on operating cost reductions. It clearly presents the scope with which sustainability can impact upon value and concludes that sustainability offers the property sector the key to improved reputation, reduced risks and greater returns.</p>
<p><i>Behind the Green Façade: Is the UK Development Industry Really Embracing Sustainability?</i></p>	<p>TaylorWessing London</p>	<p>Online: http://www.ecocem.ie/download/s/Taylor_Wessing_Sustainability_Report.pdf</p>	<p>2009</p>	<p>A report presenting the findings of a large perception study, testing understanding of sustainability by players in the market. Findings revealed that 87% would be willing to pay more to occupy a long-term sustainable building, but found a discrepancy between end-user opinion (i.e. occupier) and that overall opinion (including developers) where only 80% felt there would be a willingness to pay more. It also explores benefits and barriers, with tenant demand interestingly scoring relatively low as a driver in sustainable property.</p>
<p><i>Energy Performance of LEED for New Construction Buildings</i></p>	<p>Turner, C. & Frankel, M. New Buildings Institute/US Green Building Council</p>	<p>Online: http://www.newbuildings.org/downloads/Energy_Performance_of_LEED-NC_Buildings-Final_3-4-08b.pdf</p>	<p>2008</p>	<p>A detailed report presenting the findings of a survey of 121 LEED certified buildings in 2006 at various levels (from certified to platinum) tracking actual energy use compared to the national average building consumption, adjusted for a range of factors such as climate. The conclusion points to LEED certified buildings showing, on average, between 23-30% saving with higher rated buildings saving considerably more. However, it suggests more detailed modelling is undertaken and improvements to the LEED programme. Whilst not addressing value, it provides new data supporting the business case via occupational savings in energy use.</p>

<p><i>Making the Case for a Code for Sustainable Buildings</i></p>	<p>UK Green Building Council</p>	<p>Online: www.ukgbc.org/site/document/download/?document_id=506</p>	<p>2009</p>	<p>A contemporary report discussing the need for a Code for Sustainable Buildings in the UK and the form which it should take.</p> <p>Although not primarily tackling the issue of value, the report identifies that the definition of a sustainable building must be founded on standard quantitative measures in order to support the business case. Acknowledging that the value proposition has yet to be proven, it notes that a set of clear indicators differentiating one building from another are what is required to allow people to define the worth of different metrics and therefore value sustainability features accordingly.</p> <p>The report then systematically runs through the existing business case and barriers and clearly outlines the role of valuation and the profession in the process.</p>
<p><i>Responsible Property Investing. What the Leaders are Doing</i></p>	<p>UNEP Finance Initiative Property Working Group Geneva</p>	<p>Online: http://www.unepfi.org/fileadmin/documents/responsible_property_investing_01.pdf</p>	<p>2008</p>	<p>A report outlining approaches and initiatives for implementing financially sound Responsible Property Investment (RPI) practices.</p> <p>The paper presents views as to how improved income and value can be generated through lowering various expenses or by lower capitalisation rates and risk premia. It presents a range of case studies showing where different approaches have been implemented and the associated financial data. However it recognises that the case studies have not been verified and suggests that readers should judge whether findings are valid.</p>
<p><i>Making the Business Case for High Performance Green buildings</i></p>	<p>US Green Building Council Washington</p>	<p>Online: https://www.usgbc.org/Docs/Member_Resource_Docs/makingthebusinesscase.pdf</p>	<p>2002</p>	<p>A publication setting out a wide business case for buildings 'green buildings' that meet both LEED and Energy Star standards.</p> <p>The articles lays down 10 key areas in which sustainable property can add value compared to conventional property and also suggests that as 'green' buildings are increasingly recognised, the marketplace will follow with differential pricing, however, no hard evidence for this is detailed.</p>

<p><i>Sustainability: Measurement and Valuation: Insights from Australia and New Zealand</i></p>	<p>Warren-Myers, G. & Reed R. 15th Annual Pacific Rim Real Estate Society Conference, Sydney, Australia, 18-21 January</p>	<p>Online: * http://www.greenbuildingfc.com/Home/ResearchLibrary.aspx</p>	<p>2009</p>	<p>A topical paper based on PhD research explaining the link between sustainability and value. It presents preliminary analysis of a large survey of a) property investors and b) commercial valuers to identify investment perception of sustainability and value and barriers and drivers between the two, particularly focussing on the use of rating tools. It concludes that issues with existing rating systems such as a lack of a single system and lifecycle performance, means that accurately identifying the market value of sustainability is hindered.</p>
<p><i>Green Design and the Market for Commercial Office Space</i></p>	<p>Wiley, J.; Benefield, J. & Johnson, H. The Journal of Real Estate Finance and Economics</p>	<p>Online: * http://www.jrefe.org</p>	<p>2008</p>	<p>A study considering the relationship between energy-efficient design and the leasing/sales market for commercial real estate. The study examines and models CoStar data for leasing activity in Class A property using a sample of over 7000 properties. The modelling results provide evidence green-labelled buildings achieve higher rents (c.8% Energy Star & 16% LEED) and higher occupancy rates (10% Energy Star & 16% LEED). Using this data it estimates that sale premiums of \$30/sq ft & \$129/sq ft respectively could be achieved. However, the paper notes that it is likely that 'green' space trades in niche markets with supply and demand imbalances and premiums will adjust as new products come to the market.</p>
<p><i>Energy Efficiency in Buildings</i></p>	<p>World Business Council for Sustainable Development (WBCSD)</p>	<p>Online: http://www.wbcsd.org/DocRoot/1KDpFc18x5i63cZ5AGxQ/EEB-Facts-and-trends.pdf</p>	<p>2008</p>	<p>A comprehensive report by WBCSD examining the business case for energy efficiency in buildings from a variety of stand points and using data collected from many countries. It looks at barriers, professional knowledge and opportunities. Issues surrounding cost are addressed at length and the report briefly comments that the "value proposition will continue to develop, given the right market structures". A presentation creating a business case for buildings to comply with LEED accreditation standards.</p>
<p><i>Making the Business case for Green Development</i></p>	<p>Yudelson, J. Presentation in Melbourne, 15th February</p>		<p>2007</p>	<p>The case is founded on cost benefit analysis of green buildings from both an occupier and investor perspective and also upon the "rapid transformation" of the market creating greater financial risk and obsolescence for non-green buildings.</p>

<p><i>A Grab Bag of Green Buildings</i></p>	<p>Yudelson, J. Building Sustainable Design, 22nd April</p>	<p>Online: http://www.bsdlive.co.uk/story.asp?storycode=3111626</p>	<p>2008</p>	<p>A short piece promoting the benefits of LEED accreditation. It reports that the size and number of LEED rated projects is increasing: In particular it reports that the largest LEED rated building is now the Palazzo Resort in Las Vegas.</p>
<p><i>The Business Case for Green Buildings 2008</i></p>	<p>Yudelson, J. Building, 9th January</p>	<p>Online: http://www.building.co.uk/story.asp?storycode=3102476</p>	<p>2008</p>	<p>A short piece promoting the business case for green buildings. The piece refers to the Miller <i>et al</i> report on the Co-Star data as “case closed” on the value agreement.</p> <p>The argument is also based on the premise that the perceived cost premium for green buildings has been disproved and that the market for such properties is increasing more than ever before with the growth of the Responsible Property Investment (RPI) movement.</p>

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