Original Article

Building momentum: An analysis of investment trends in LEED and Energy Star-certified properties

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ABSTRACT This article analyzes investment trends for Leadership in Energy and Environmental Design- and Energy Star-certified buildings in the United States with a view towards deriving clues for expected future developments in the face of the current economic downturn. Empirical studies have found sales and rental price premiums of varying magnitudes, which is confirmed by a simple analysis of the post-2000 Class A office market segment. No significant difference is found for the average time to sale for eco-certified buildings. Furthermore, eco-certified buildings exhibit the growth rates typical of innovative products with particular spatial foci adopting the new product more rapidly than the rest of the country. The analysis of credit scores and certification level suggests that scores cluster around the lower boundaries of each certification level suggesting that the principle of least effort also applies to eco-certifications. Overall, the available data do not indicate a trend reversal due to the economic downturn and further growth of this market segment appears likely.

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WHY CERTIFY?

A variety of regulatory and market-based concepts are currently being discussed in an effort to meet proposed greenhouse gas reduction targets. In the absence of a unified carbon tax regime or carbon-trading scheme, eco-certification labels play a key role in promoting innovative products. In the real estate market, eco-certificates provide information on the environmental performance of a building to investors and tenants. As it is

typically not possible or feasible for market participants to directly measure the desired characteristics, for example the degree of energy efficiency of a building, eco-certifications provide signals that facilitate the matching of 'eco-consumers' to products carrying the desired characteristics. Gradually, a body of empirical evidence is emerging in real estate research that confirms eco-consumers' willingness to pay a premium for certified products. The majority of these studies have been conducted on Leadership in Energy and Environmental Design (LEED) Green Building Rating System and the Environmental Protection Agency's Energy Star system, which are two schemes that have been developed for the commercial real estate sector in the United States.

Despite receiving widespread media coverage, the share of eco-certified buildings in the overall commercial real estate market is virtually negligible in any country. In the United States, more than 50 cities and a growing number of states have incorporated standards based on the LEED rating system into their legislation and building codes. The share of actually certified buildings, however, is well below the one percent mark in all states. Given the presently low rate of market penetration, the question arises whether eco-certified properties are likely to gain a significant share of the commercial real estate market over the next few years or whether they are more likely to remain confined to a niche market relevant only to a small group of specialist investors, tenants and developers, particularly in the current adverse economic climate. Although any attempt to answer this question may appear premature or downright speculative, this article sets out to derive clues for expected future developments by analyzing recent trends in LEED and Energy Star certification. It also examines the investment characteristics against a market benchmark and provides an outlook on future developments.

THE LEED AND ENERGY STAR RATING SYSTEMS

The LEED Green Building Rating System, developed by the US Green Building Council, consists of set of standards for the assessment of environmentally sustainable construction. The rates of growth in numbers of 'green' buildings have been rapid with numbers doubling nearly every 2 years. In common with the major regional certification such as Green Star and BRE Environmental Assessment Method (BREEAM), the rating system focuses on six broad categories related to: sustainability of location, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality and innovation and design process.

The US Green Building Council's LEED certification system comprises a number of distinct rating systems aimed at various components of a property and along the development process. The majority of LEED certifications are obtained under the auspices of the LEED for New Construction (LEED-NC) rating system, which is designed for new buildings and major renovations. The LEED for commercial interiors (LEED-CI) makes up the second largest share of all registered projects and is suitable for tenant improvements and refurbishments that do not involve building shell and structure. Buildings in which the owner or developer controls less than 50 per cent of tenant improvement are

typically referred to the LEED Core and Shell (LEED-CS) system. The main difference between LEED-CI and LEED-CS is that the former is more geared towards tenants seeking certification within a multi-tenant facility whereas the latter is mainly suitable for developers. Finally, LEED for Existing Buildings (LEED-EB) is a rating system that covers ongoing building operations without any major refurbishments. Originally designed as a program for following up LEED-NC-rated buildings, LEED-EB has become a stand-alone system for owners of existing buildings who wish to obtain eco-certification.

Certification of buildings that meet the requirements of one of these rating systems is differentiated into four different levels of LEED accreditation depending on the overall credit achievement score. In LEED v3, which was introduced in April 2009, certified projects can achieve a total of 100 points plus six points for innovation in design and a further four points for categories that are of particular importance in a specific region (for example, water in the south-western United States). The resulting classification is as follows:

- Certified - 40–49 points
- Silver - 50–59 points
- Gold - 60–79 points
- Platinum - 80 points and above

Although there is a LEED rating system for existing buildings, the Energy Star scheme tends to be more popular with owners in the existing stock. The Energy Star scheme involves an assessment of buildings' energy performance. Buildings are awarded a score out of 100. Only buildings that are in the top quartile are eligible for Energy Star accreditation. Office properties tend to dominate both the LEED and Energy Star in terms of space and numbers (Nelson, 2007). Although a large part of the certified large commercial office buildings typically contain some retail, hospitality, recreational and residential space, the LEED database indicates that there are fewer than 40 retail and hotel properties. The number is higher in the Energy Star database, comprising approximately 40 hotels and a relatively large number of EnergyStar-certified retail properties. Retail stores make up the third largest property type behind offices and schools in terms of Energy–Star-rated floor space (not necessarily certified space) and hotels/motels are fifth in this ranking. Recognizing that retail properties have a number of distinct characteristics and requirements that set them apart from other property types, the United States Green Building Council (USGBC) has introduced a dedicated pilot program named LEED Retail in the 2009 release of LEED v3.

EMPIRICAL EVIDENCE ON THE BUSINESS CASE FOR CERTIFIED BUILDINGS

Most existing empirical studies identify a cost premium associated with LEED-rated new buildings and that the higher rated buildings tend to have a higher cost premium (for example Morrison Hershfield, 2005). However, the cost premium is typically found to be relatively low ranging from 2 per cent to 10 per cent depending on the level of rating. In return,

a range of benefits are attributed to green buildings or associated with features common in green buildings: reduced operating costs, improved productivity, improved image for occupiers and owners and reduced operating and regulatory risks. Micro-level studies have found that the present value of the reduced operating costs alone is sufficient to cover the construction cost premium (see ECOFYS, 2003; Kats, 2003). In turn, surveys of willingness-to-pay have found that occupiers have stated that they are prepared to compensate owners for the additional costs of green buildings through higher rents (see McGraw Hill Construction, 2006 and GVA Grimley, 2007 for examples).

Although it is indisputable that some attributes of buildings have clear effects on their market price, it is not always clear that increased cost due to higher specification leads to increased value. Rational investors will require a combination of higher income and/or reduced risk to compensate for the additional cost. In research on the pricing of variations in lease terms, the standard assumption of lease pricing models is that real estate investors will extract the same value from the property regardless of leases structure (see Grenadier, 1995; Ambrose *et al*, 2002). Put differently, investors are assumed to be fully compensated for the costs of providing attributes that occupiers demand. It appears, however, that institutional features of the rent determination process may prevent the transmission of expected price effects to actual price. Four recent studies conducted on a similar data set (CoStar) have identified rental and sales price premia, albeit with varying magnitude and statistical significance (Miller *et al*, 2008; Eicholtz *et al*, 2009; Fuerst and McAllister, 2009; Wiley *et al*, forthcoming). A further alleged advantage of eco-certified buildings is that they have lower vacancy rates. In a recent study, Fuerst and McAllister (2009a, b) found empirical support for this assumption.

The consensus emerging from the studies cited above is that investors in eco-certified buildings may be rewarded for the additional costs in three main ways: higher rents/prices, lower holding costs and/or lower risk. This suggests that failure to observe rental premiums for certified buildings does not necessarily imply market imperfection. Effects may be identified in either the occupier and/or the investment market. However, assuming an efficient market, such effects should be observable in capital values and/or transaction prices. Assuming that certification results in higher overall costs, failure to observe price premiums in certified buildings would provide an economic disincentive to real estate investors to supply certified buildings to the market.

TRENDS IN LEED CERTIFICATION AND INVESTMENT

As stated above, LEED accreditation is split into a number of different rating systems for specific parts of a building and specific groups of clients. Figure 1 shows the share of individual rating systems in all LEED-registered projects as of March 2009. Given the great importance of the existing stock in tackling climate change, it is remarkable that accreditation of existing buildings makes up only six per cent of all projects. Yudelson (2008) attributes this to the magnitude of the investment for both the certification process and potential modifications

Figure 1: Share of LEED rating systems in all registrations (as of March 2009).
Source: USGBC.

Figure 2: Achieved levels of LEED certification (as of March 2009).
Source: USGBC.

to the building. An additional factor may be that owners feel that there is limited scope for improvements to an existing structure compared to new construction. This may change in the near future, however, as a number of large corporations and property managers (for example, CB Richard Ellis (CBRE)) aspire to seek certification for virtually all of their buildings. As new construction rarely constitutes more than 1 per cent of the existing stock of buildings, a shift to existing buildings appears necessary in order for LEED and similar certification programs to have any significant impact on total greenhouse gas emissions.

The breakdown by level of certification shown in Figure 2 reveals that the certified, silver and gold standards have similar shares among all certified buildings. Only about five per cent of buildings reach the highest certification standard (platinum). Whether these classifications are meaningful in terms of energy efficiency is subject to debate, however. An empirical study of 100 LEED buildings by Newsham *et al* (2009) found that energy use correlated only weakly with certification level of a

Figure 3: Distribution of credits achieved and certification levels (as of March 2009).
Source: USGBC.

building and that about one third of LEED-certified buildings used more energy than matched non-certified comparables.

A more fine-grained analysis of the credit achievement tally reveals another interesting phenomenon. As Figure 3 shows, there are significant clusters of projects on the lower thresholds of each level. The situation appears slightly different for the gold level but even in this category a clear decrease in the number of projects achieving points nearer to the upper limit of this level is clearly visible. This suggests that organizations seeking certification seek to minimize the effort and expense necessary to achieve the certification level they aspire to. It may also suggest that once organizations realize that a higher certification level is within reach, they may opt to commit the additional funds necessary to obtain a higher level of certification rather than ‘wasting’ points on a level achievable with a lower point total. This interpretation requires further research into the trade-off between investments and certification levels, however, as there may be other reasons causing the patterns observable in the data.

A frequent criticism leveled at the LEED-certification program is that the lower certification standards, particularly the ‘certified’ level make no serious contribution to tackling climate change and other environmental problems, and instead may lead to complacency on the part of owners having achieved LEED certification albeit at the lowest level (a phenomenon called ‘greenwashing’ by eco-certification critics). Advocates of the LEED system emphasize, however, that certification standards have evolved considerably over the last years to accommodate more stringent and effective standards regarding the environmental performance of a building. In the context of this debate, it is interesting to note that the number of buildings certified at the lowest level has steadily decreased over the ten years since the inception of LEED, reaching its hitherto lowest level in 2008 (Figure 4). Conversely, the shares of gold-and silver-certified buildings have significantly increased whereas the share of platinum has remained relatively stable over time. This may be taken as an indication of generally lower public acceptance of ‘barely green’

Figure 4: Distribution of certification levels 2000–2008.
Source: USGBC.

Figure 5: Number of certified LEED buildings (2000–2008).

buildings and/or more ambitious goals set by organizations seeking certification.

When considering changes in the relative composition of certified projects over a period of almost 10 years, it is important to recall that the absolute number of projects has increased dramatically during that time. Figure 5 shows the number of properties obtaining new certification in each year starting in 2000. The graph confirms the dynamic growth pattern generally attributed to the green building movement. A possibly important clue for the future development of eco-certification for buildings is the fact that the current recession, which according to most sources began around December 2007, has had no visible impact on the exponential growth of building certifications. Although this is reason for cautious optimism, it may still be too early to gauge the true impact of the economic downturn as buildings ‘in the pipeline’ will normally follow through on certification plans conceived earlier. In the observable period up to the end of 2008, however, there are no signs of a trend reversal.

Figure 6: The changing composition of organizations and companies seeking LEED certification. Sources: USGBC, RREEF.

A further point of criticism concerning eco-certification programs is that they are ‘big government’ initiatives disguised as market-oriented, industry-led organizations. Opponents of eco-certification argue that both the supply of and demand for eco-certification predominantly originates from the public sector and that there is no evidence of a ‘green’ business case in the real estate and construction industries. Apart from the recent studies indicating that eco-certified programs do indeed achieve rental, price and occupancy rate premia, the share of corporate clients and private developers seeking LEED certification has increased steadily since its inception. Figure 6 provides an analysis of clients seeking LEED certification by type of organization. The share of private developers and corporate clients has increased considerably from 46 per cent in the 2000-2002 to 60 per cent in the most recent 2006-2008 period. The growth of the share of private developers from 3 to 26 per cent is particularly encouraging as this indicates that certification appears to be seen as a valuable investment by an increasing number of developers. Given the exponential growth of certified buildings described above, this trend becomes even more impressive when considered on an absolute basis (that is, number of projects certified for private developers in each period).

TRENDS IN ENERGY STAR CERTIFICATION AND INVESTMENT

The growth of Energy Star certifications and the growing number of facilities undergoing energy performance measurement and ratings under the Energy Star scheme largely mirrors the pattern of LEED certifications described in the previous section. Within 1 year (2007–2008), the total square footage of rated floor space grew by 53 percent. As mentioned above, only buildings obtaining a rating of 75 or higher on the 100-point scale are awarded the Energy Star (ES)-label. Figure 7 illustrates the growth in ES-labeled space in the last decade. The picture emerging from this analysis underscores the diffusion pattern found for LEED certification. Both types of certification follow a market penetration path that resembles the stylized phases of product innovations. Whether the demand for eco-labeling will continue on this path throughout the economic downturn is subject to speculation and it is evident that the

Figure 7: Cumulative floor space of Energy Star labeled buildings in millions of square feet.
Source: Energy Star.

ultimate market potential for certified buildings hinges to a large extent on future changes in the regulatory environment.

A number of recent studies have suggested that adoption of 'green' products is not distributed evenly across space but tends to occur in spatial clusters. Kahn and Vaughn (2009) show that adoption rates of both LEED certification and hybrid vehicles exhibit a similar spatial pattern in a zipcode-level analysis of California. They show that adoption rates can be predicted using socio-economic and revealed preference political data. A quick look at the distribution of Energy Star and LEED certified buildings across the United States appears to confirm this assumption. Table 1 reports the shares of states in both the Energy Star and LEED schemes. To equalize size effects among the states, a 'location quotient' is introduced which is the ratio of a state's share in the respective eco-certification program to its population share in total US population. Thus, a quotient larger than 1 indicates that the share of a state in eco-certifications is higher than its population share would suggest and vice versa. In the final column, LEED and Energy Star location quotients are summed to show the overall spatial concentration of both ratings programs. The table reports the top 20 states using this combined measure.

ECONOMIC AND FINANCIAL CHARACTERISTICS OF LEED AND ENERGY STAR-CERTIFIED BUILDINGS

What are the driving forces behind the growth of eco-certified buildings illustrated above? Are the observed market penetration rates merely a reflection of a broader societal trend towards more environmentally conscious behavior with no economic and financial credentials? Or is it the expectation of impending government regulations that makes private companies seek voluntary certification rather than the existence of tangible economic benefits occurring in the short-to medium-run? To answer these questions, it is pertinent to analyze key indicators of financial and economic performance to the extent that they are available to academic researchers. Figure 8 shows

Table 1: Top 20 states for Energy Star and LEED-certified properties in relation to population size

State	ES%	ES_LQ	LEED%	LEED_LQ	Sum of LEED & ES LQs
District of Columbia	1.30	6.84	1.86	9.79	16.63
Colorado	4.27	2.69	4.17	2.63	5.31
Oregon	1.31	1.07	5.10	4.15	5.22
Massachusetts	2.74	1.30	5.80	2.75	4.05
Washington	2.24	1.06	5.80	2.75	3.81
Vermont	0.16	0.80	0.56	2.79	3.59
Virginia	5.60	2.22	3.20	1.27	3.49
North Carolina	7.42	2.41	2.74	0.89	3.30
Wisconsin	3.94	2.15	1.95	1.07	3.22
Maine	0.26	0.60	0.97	2.26	2.86
California	20.24	1.69	13.08	1.09	2.79
New Hampshire	0.24	0.56	0.88	2.04	2.60
Delaware	0.59	2.11	0.13	0.48	2.59
Michigan	3.62	1.10	4.68	1.42	2.52
Minnesota	2.82	1.66	1.16	0.68	2.34
Hawaii	0.42	1.00	0.51	1.21	2.21
Idaho	0.56	1.14	0.51	1.03	2.18
Pennsylvania	2.5	0.62	5.98	1.47	2.09
Maryland	1.90	1.03	1.72	0.93	1.96
Texas	10.78	1.38	4.40	0.56	1.94

Figure 8: Average rent per square foot. for LEED/Energy Star compared to peer group (only Class A buildings built in 2000 or after are included in both categories).

Source: CoStar.

a time series of rents for LEED and ES-labeled Class A office buildings compared to the Class A average. Only newer buildings that were built after the year 2000 are included in both samples. Although this comparison does not contain controls for possible systematic differences in size and location, it provides an indication that rental rates of LEED and Energy Star have been consistently higher in the past 5 years. Another important factor to consider is the speed of leasing or selling eco-certified properties. Anecdotal evidence suggests that lease-up and sales times are significantly lower for certified buildings compared to similar non-certified buildings. The empirical data presented in Figure 9 suggest, however, that the average time to

Figure 9: Average time on market for LEED/Energy Star-certified buildings compared to peer group (only Class A buildings built in 2000 or after are included in both categories).

Source: CoStar.

sale for eco-certified buildings largely tracks the Class A market average. Although a more thorough analysis is needed to establish the facts regarding average lease and sale periods, a possible explanation of the findings at hand could be that higher attractiveness of eco-certified buildings does not translate into lower time on market as the matching of sellers to buyers who are willing to pay a premium takes longer for certified space.

Finally, Figure 10 shows the time trend for sales transaction prices on a per square foot basis. This confirms that both LEED and Energy Star buildings achieve higher average prices than their Class A peers. Although there is a possibility that this premium may not be entirely attributable to eco-certification, it is in line with the findings of most regression-based hedonic analyses cited above.

CONCLUSIONS AND OUTLOOK

This article has set out to analyze investment trends for LEED-and Energy Star-certified buildings in the United States with a view towards deriving clues for expected future developments in the face of the current economic downturn. From the extant literature, a consensus is beginning to emerge that certified buildings carry a sales and rental price premium both on theoretical and empirical grounds. Furthermore, eco-certified buildings exhibit the growth rates typical of innovative products with particular spatial foci adopting the new product more rapidly than the rest of the country. Ultimately, the future path of eco-certified buildings is also determined by regulatory interventions, for example new legislation on mandatory certification or the introduction of mandatory carbon-trading schemes. In the absence of such measures, labeling and the definition of industry standards remains a vital task for promoting products with higher environmental performance in the real estate market. The analysis of credit scores and certification level suggests that organizations seeking certification

Figure 10: Time trend of sales price per square feet. (only Class A office buildings in all three categories 2009 includes Jan–July 2009).
Source: CoStar.

attempt to minimize the effort required to obtain the certification level they aspire to. This also shows that the degree of ‘greenness’ of a building is becoming increasingly important as compared to simply having obtained some form of certification. Although the Energy Star rating is by definition an evolving system as it only awards the label to the top-performing quartile, the US Green Building Council has made significant steps towards improving and refining the existing schemes. This includes a stronger focus on improving energy efficiency and lowering greenhouse gas emissions, which are ultimately the litmus test for the superior environmental performance of eco-certified buildings. Based on these observations, it appears that the market for eco-certified buildings is well positioned for further growth, particularly if a larger percentage of existing buildings is beginning to seek certification.

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