

# Does Green Pay Off?

By Norm Miller, Jay Spivey and Andy Florance<sup>1</sup>

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Contact Author: Norm Miller at [nmiller@sandiego.edu](mailto:nmiller@sandiego.edu)

**Executive Summary:** In this study and call for further research we provide some comparison data on energy star and LEED certified buildings versus non-energy star or Non-Leed certified office property from the entire US using CoStar data base. These results are promising for the benefits of investment in sustainable real estate, energy savings and for the green movement now sweeping our society. The payoff from wise green investment is easy to justify even if based on purely profit motivations.

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<sup>1</sup> Norm Miller is a professor at the Burnham-Moores Center for Real Estate, [nmiller@sandiego.edu](mailto:nmiller@sandiego.edu). Jay Spivey is the research director at CoStar, and Andy Florance is the CEO of CoStar.

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Here we reveal one of the first systematic studies that addresses questions on the benefits of investments in energy savings and environmental design. A parallel effort undertaken by Fuerst and McAllister (2008) finds similar results to those presented here and using the same data source, while Eicholtz, Kok, and Quigley (2008) find slightly more modest yet positive results. We compare all USA based Energy Star office buildings as one measure of “green” building and also LEED certified office buildings as another measure of “green” with a large sample of non-Energy Star and non-LEED rated buildings. Essentially, Energy Star buildings are those within the 25% most efficient buildings for energy conservation. LEED certified buildings are based on the standards provided by the US Green Building Council, USGBC. We do not have sufficient data history to break down LEED certification into various levels (certified, silver, gold, platinum) or even to provide extensive descriptive statistics, but we do have sufficient data to try and provide a preliminary indication as to the value added by the general LEED rating. We also note that other ratings exist both in the US and Globally and that we need better measures of building efficiency, productivity and operation adaptability, but we leave such discussions to future research.<sup>2</sup>

To date, most studies on the benefits of green investment are case studies. See for example, Kohlhepp (2007), RICS (2005) and Scheer and Woods (2007). From such case studies we form strong opinions about the costs and benefits of green investment, yet a single case is seldom the prototypical mean and there exists much local variation that adds to or reduces the marginal costs of going green. Here we go way beyond case studies starting with a data base of over 2.4 million properties and pairing it down to a comparable set for the office market.

With respect to the all important question of added costs, most available surveys on the costs are from the USGBC and as such some developers are skeptical of potential downward bias. Developers point out the direct cost of certification and the high indirect costs of dealing with inflexible, uninformed and uncooperative local building code regulators or the lack of local experts and resources. Clearly the costs of going green vary by local market, the number of vendors and experience in the local market, developer/owner experience and project or portfolio scale.<sup>3</sup> The indirect costs of green efforts, manifested in frustration and brain damage, are more difficult to estimate, yet such costs are clearly coming down and we have every reason to believe that they will continue to decline. Here we will lay out what we know from available resources and data.

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<sup>2</sup> See *The Costs and Benefits of High Performance Buildings: Lessons Learned*, published by Earth Day New York, 2007 which includes a compilation of excellent articles on performance measures. See also “*User Effective Buildings*” By Aardex Corporation, 2004.

<sup>3</sup> Costs to upgrade existing buildings to various LEED certification levels allow for great economies of scale when a large number of similar buildings are being retrofitted. This is the low hanging fruit that astute investors have already been exploiting with extremely high payoffs.

We also note up front that many of the benefits of green and high performance buildings may not yet show up in higher base rents in some local markets.<sup>4</sup> The reason is simple. Most of the benefits accrue to tenants and tenants require proof before they are willing to share in the cost of investments that theoretically will help them be more productive or save money. Only in very recent years have tenants started to fully appreciate the benefits of cleaner air, more natural lighting and easier to modify spaces. A survey of 500 corporations completed by Grant Thornton in the summer of 2007 indicated that 75% of executives responded that their companies would be spending more on environmental programs in the future. 68% of those surveyed expected environmental responsibility reporting to become mandatory within three to five years.<sup>5</sup>

Supporting investments in environmentally responsible facilities, a study by Greg Kats of Capital E Analytics in early 2007 provided the following summary of benefits from going green, as shown in Exhibit A-1 of Appendix 2. Productivity benefits are estimated to be as much as 10 times the energy savings from green efforts. These benefits come in the form of lower absenteeism, fewer headaches at work, greater retail sales and easier re-configuration of space resulting in less downtime and lower costs. His cost estimates based on a sample of 33 office and school buildings suggested only .6% greater costs for LEED certification, 1.9% for silver, 2.2% for gold, and 6.8% for platinum certification. These estimates are obviously direct costs but they are quite close to those provided by the USGBC. Earlier a book published by the Aardex Corporation suggested that effective buildings could increase tenant productivity by at least 30%. (See Aardex 2004) Aardex considered lighting, air quality, layout, and much more in their building systems with many criteria that are not part of the LEED scoring system. We need more studies on productivity to be sure that such claims of higher productivity are not just short term or the placebo effect of new environments.

If tenants are not willing to pay higher base rents for greener buildings, is it still worth going green?<sup>6</sup> The answer is likely positive if:

- (1) You accept claims of faster absorption and or
- (2) If you expect to hold the building for several years and you believe our value impact results that derive from not only rents, but lower operating expenses and lower cap rates.

Here we focus only on the direct real estate benefits and we do this with a sample including most of the for-rent office data available for the entire USA.

## **Data**

CoStar is the leading collector of property data. A few years ago, CoStar started to note whether buildings were Energy Star-rated or LEED-certified. As of early 2008, there were over 1200

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<sup>4</sup> Faster absorption is almost always mentioned by developers who have invested in LEED or Energy Star buildings even if they do not observe higher rents. We have no data to support the absorption claim at this time but have no reason to question it's validity.

<sup>5</sup> See "Top Executives are Embracing Corporate Responsibility" by Anne Moore Odell from SocialFunds.com as reported in GreenBiz.com. See [http://www.greenbiz.com/news/reviews\\_third.cfm?NewsID=35955](http://www.greenbiz.com/news/reviews_third.cfm?NewsID=35955) Summer, 2007.

<sup>6</sup> While anecdotal in nature, when several tenants including Cisco, PNC, IBM, Toyota, PepsiCo where asked if they would pay more rent for a green building they all said "No" but they all added that they would pay less for a building that was not green, so part of the problem is one of framing and perspective.

Energy Star-rated buildings in the database and more than 900 office buildings, over 220 retail, 25 industrial, 53 hospitality and 12 others. 580 buildings in the data based were LEED certified but the sample available for comparing occupancy, rents and values was much smaller than for energy star buildings. The Energy Star-rated buildings included 322 million square feet. The typical Energy Star office building is Class A with 353,000 square feet, 15 floors, built in 1985, multi-tenanted, and 91.7% leased. The following filters were used to develop the comparison sample studied here:

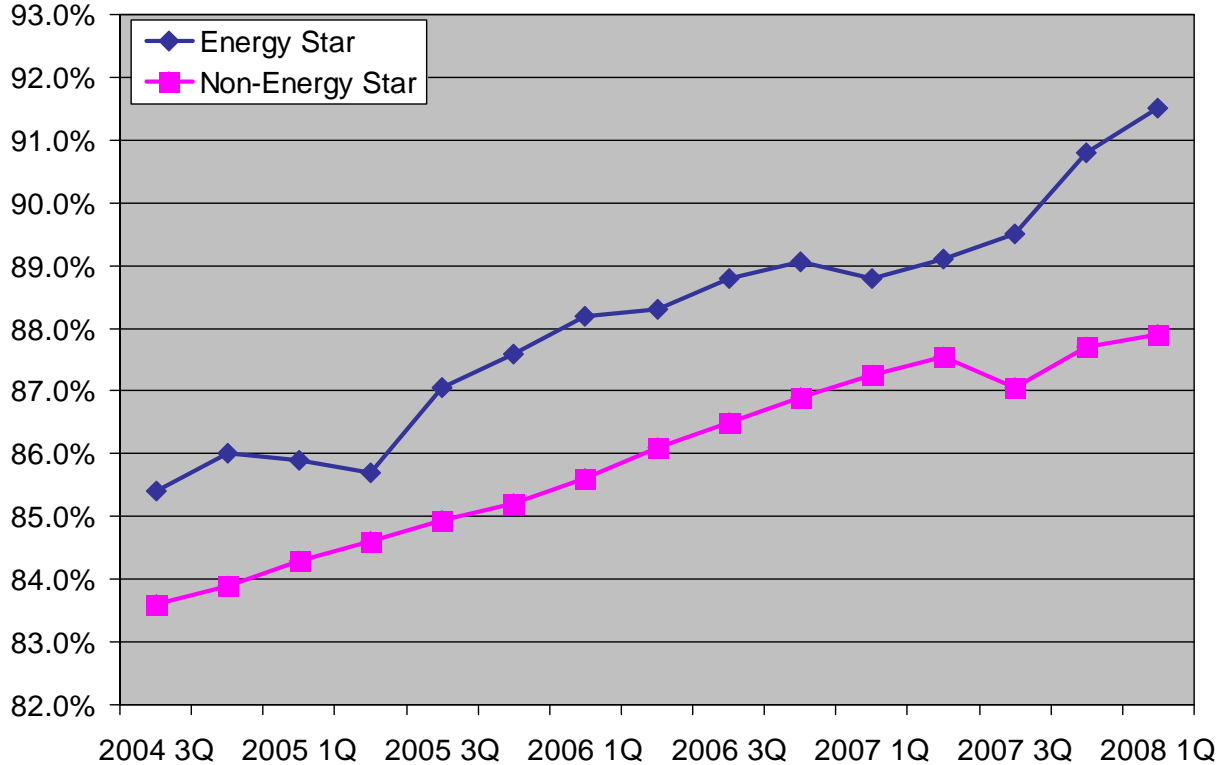
- ✓ Only Class A office buildings
- ✓ 200,000 square feet or more
- ✓ 5 stories or more
- ✓ Built since 1970
- ✓ Multi-tenanted

72% of the Energy Star buildings met all these criteria which resulted in a sample of 643 buildings. The non-Energy Star buildings meeting these criteria numbered over 2000 with nearly a billion square feet.

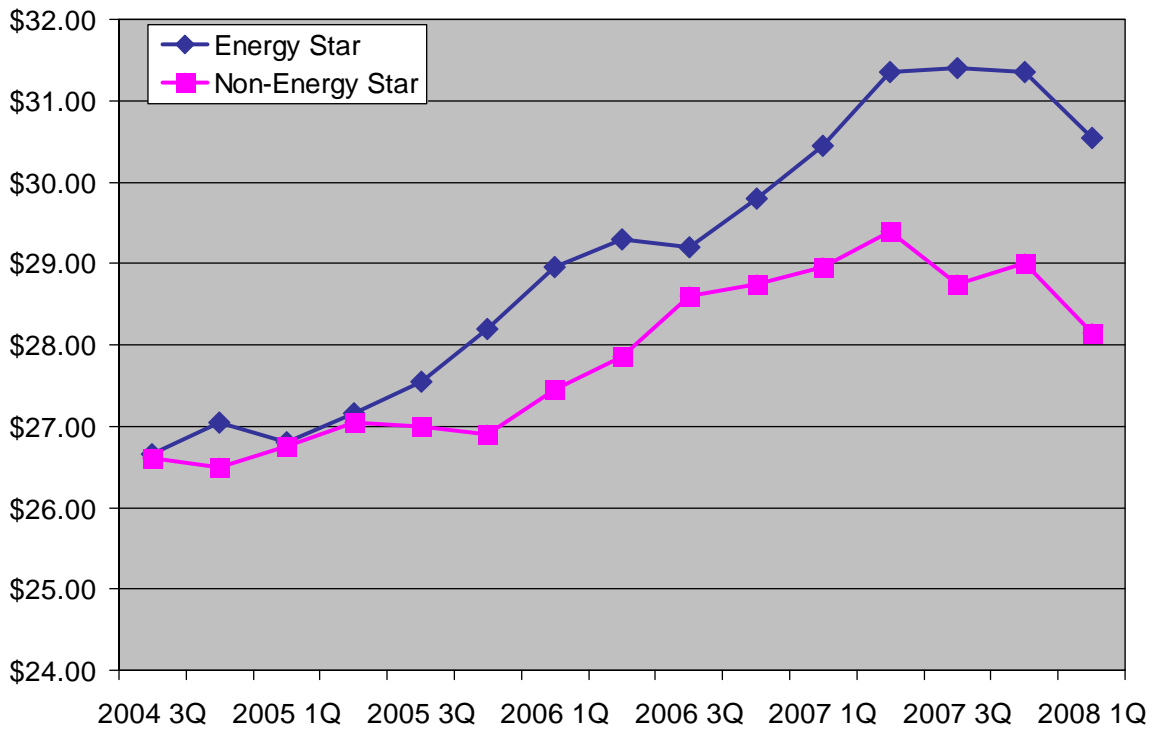
### General Descriptive Results

Data comparison results are provided in seven Exhibits that follow below.

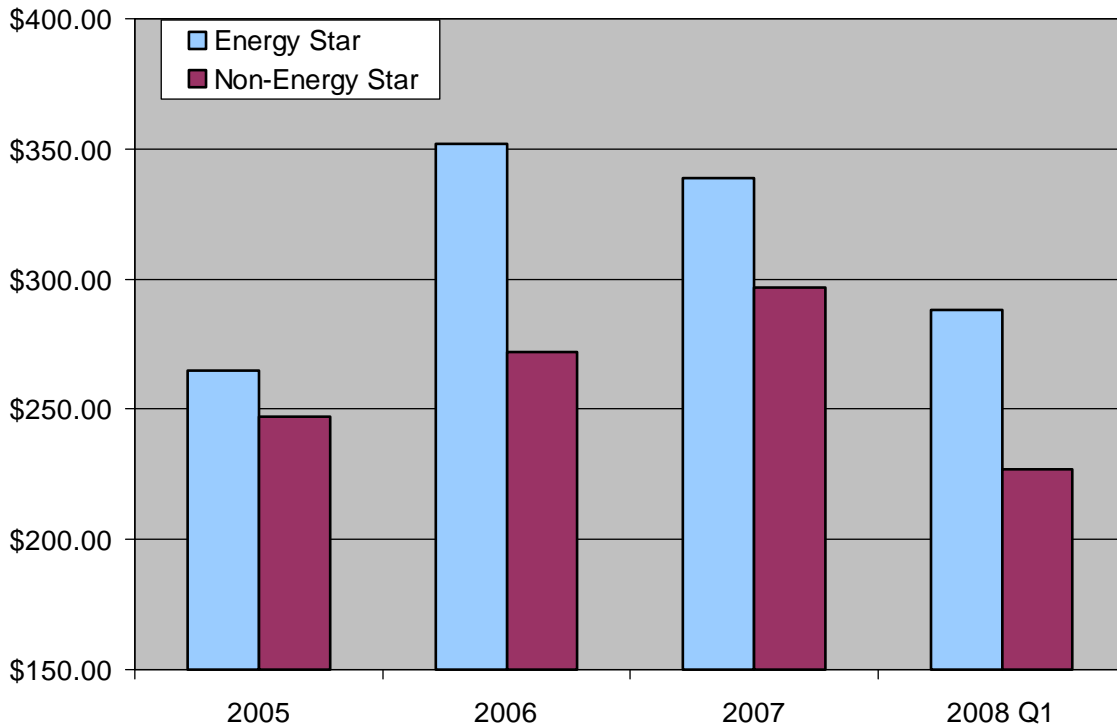
**Exhibit 1: Occupancy Rates By Qtr Through 2008**



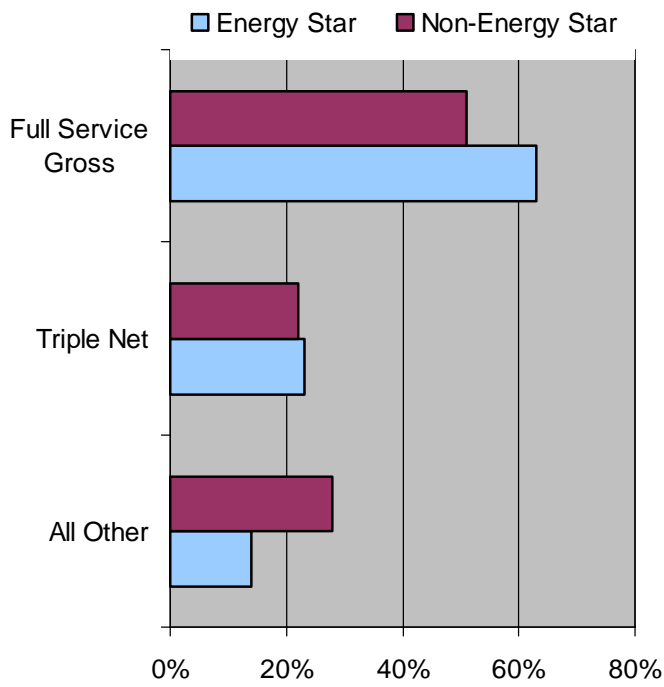
**Exhibit 2: Direct Rental Rates Through 2008 Q1**



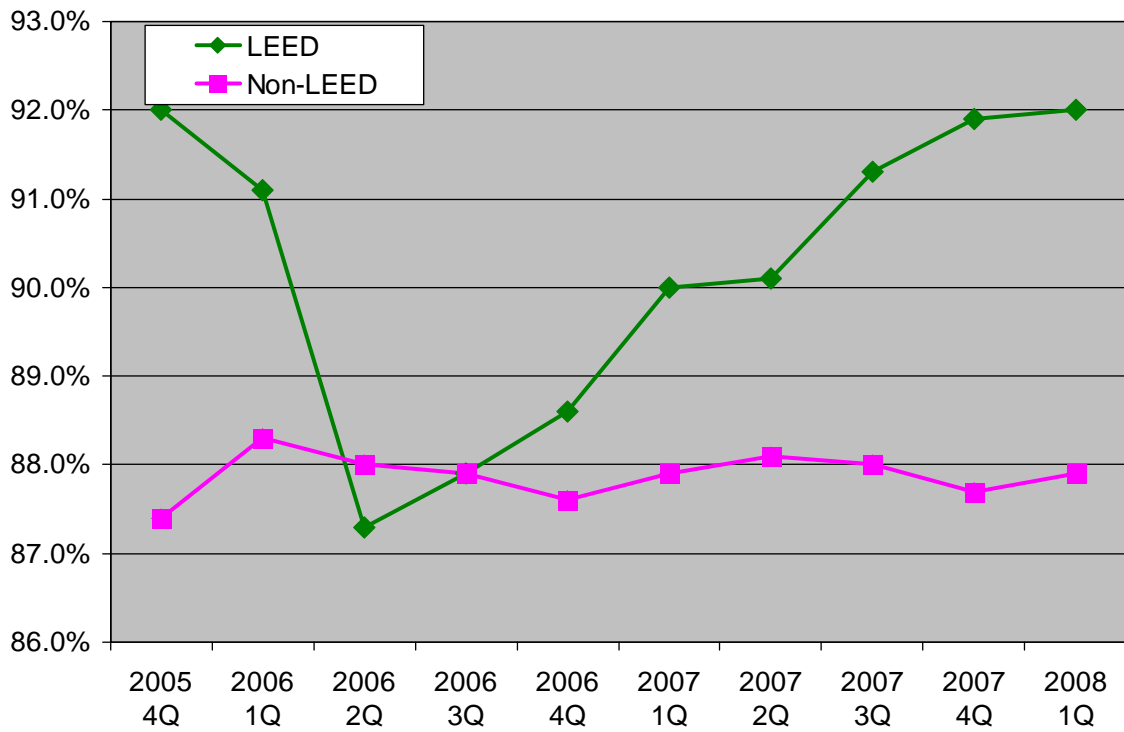
**Exhibit 3: Sales Prices Per Sq Ft**



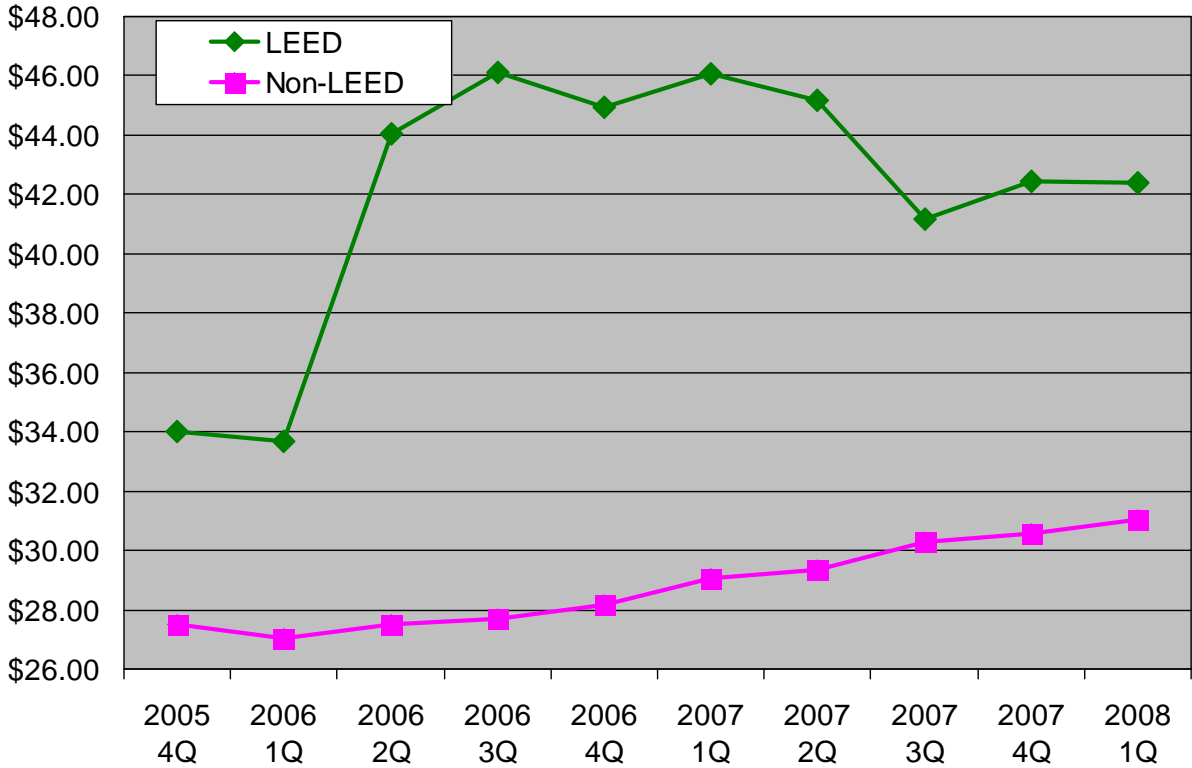
**Exhibit 4: Lease Structures**



**Exhibit 5: Occupancy Rates Through 2008 Q1**



**Exhibit 6: Direct Rental Rates Through 2008 Q1**



**Exhibit 7: LEED versus Non-LEED Sales Prices Per Sq Ft**



We did not have data on absorption rates but casual surveys suggest much faster absorption rates for LEED certified buildings. Operating expenses based on energy costs also varied with Energy Star-rated buildings running \$1.27 per square foot per year for energy in 2006 compared to non-Energy Star-rated buildings running \$1.81 per square foot. These 50 cent of so differences continue to be reported in 2007.

The sample of properties where cap rates were known is modest but we observe a differential in terms of lower cap rates by about 55 basis points suggesting higher values by just under 10%. Together, the higher occupancy rates, higher rents and lower operating expenses logically translate to higher values but not necessarily by the differential shown in descriptive Exhibit's 3 and 7. One might suggest that the LEED and Energy Star rated buildings are newer or more recently retrofitted and thus the general statistical results above would not hold for a more controlled comparison. Below we provide a more controlled comparison using standard regression analysis.

### Price Impact with Age, Location and Time of Sale Controlled

To try and understand if the differentials observed above are valid or spurious and correlated with newer buildings in more expensive cities, we ran several hedonic models. With sales price per square foot as the dependent variable the following model was tested:

$$\text{Sales Price/Sq Ft} = \alpha + \beta_1(\text{Age}) + \beta_2(\text{ES}) + \beta_3(\text{LEED}) + \beta_4(\text{Size}) + \beta_5(\text{CBD}) + \beta_6(\text{Yr dummy}) + \beta_7(\text{City Dummy}) + \varepsilon$$

Where  $\alpha$  is the constant,  $\beta$  is the regression coefficient for each variable and  $\varepsilon$  is the error or residual term. We experimented with several forms of this model to examine the effects with only Energy Star or only LEED certification in the model, as well as with several different location controls. Our general results are as follows:

R SQ =	.478	Intercept =	201.39	T-Stat	11.03 <sup>***</sup>
Adj R SQ =	.468	Age =	-4.66		-11.88 <sup>***</sup>
Std Error =	105.42	ES =	13.99		1.68*
Observations =	927	LEED =	24.14		1.79*
		Size =	0		.835
		CBD =	64.05		8.52 <sup>***</sup>
		2003 =	-6.92		18.59 <sup>***</sup>
		2004 =	20.97		17.87 <sup>***</sup>
		2005 =	51.73		17.52 <sup>***</sup>
		2006 =	75.82		17.10 <sup>***</sup>
		2007 =	103.04		17.98 <sup>***</sup>
		Boston =	161.26		18.17 <sup>***</sup>
		LA =	95.17		13.31 <sup>***</sup>
		NYC =	259.14		21.70 <sup>***</sup>
		Wash DC =	160.39		11.22 <sup>***</sup>
		San Fran =	121.51		19.19 <sup>***</sup>

\* Significant at the 85% level

\*\*\* Significant at the 95% level or above



The mean price per square foot is \$242.75 therefore the average LEED impact on sales price per square foot is a positive 9.94% or roughly 10%. The Energy Star impact on selling price is 5.76% on the positive side. Interestingly and very surprising, the correlation between LEED and Energy Star in this data base is -.064 so we are fairly sure that these effects do not contain any multicollinearity. When the variables were tested independently the coefficients barely moved. Thus, it appears in this data set and based on 2003-2007 data the benefits from LEED certification and Energy Star investment are cumulative, despite the fact that there should be a correlation between the two variables.

### **What Does it Cost to Go Green?**

We do not have a large sample of cost data on achieving Energy Star ratings nor do we have neutrally supplied data on LEED certification, say from contractor samples, but we do have data as supplied by the USGBC (Exhibits 8 and 9) and anecdotal surveys. According to surveys of those meeting the minimum LEED certification, the average costs are reported to be about 3% extra vs. the zero figure provided by the USGBC.<sup>7</sup> With silver at 2.5% extra, plus the 3% as reported by developer surveys, we are still only at 5.5%. The reason for a developer premium is that there are still certification costs to go green. This includes fees to the USGBC and third parties who certify the building at various levels as well as the time necessary to await certification. Many local building codes are not flexible nor in tune with LEED standards so this education process adds to the costs. In some cities like Portland, Oregon, we observe the adoption of integrated building codes. In Portland this is called PDX LEED which puts the city on board with sustainable objectives and makes the process easier.<sup>8</sup>

### **Local, Regional, State and Federal Mandates and Incentives Affecting Costs to Go Green**

One factor affecting the cost to go green are the mandates and incentives provided by local governments, utilities and other non-profits, trusts and foundations. If a city such as San Francisco requires Gold Certification as of 2012 on office projects larger than 50,000 square feet the marginal costs of achieving LEED certification up through the Gold level becomes zero since there will be no alternative. This is the case for many cities with regulations slated to become effective over the next several years.<sup>9</sup>

Over time as more cities will be adopting mandates to require LEED certification. Some will provide incentives such as Cincinnati which provides a property tax rebate on LEED certified buildings for up to \$500,000 over 15 years for new buildings and 10 years for existing

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<sup>7</sup> These are surveys by the authors with a modest sample of only 26 respondents, so we do not suggest these are definitive.

<sup>8</sup> See [www.portlandonline.com/osd/index.cfm?c=4167&a=114662](http://www.portlandonline.com/osd/index.cfm?c=4167&a=114662)

<sup>9</sup> See [www.dsire.org](http://www.dsire.org) which lists incentives and many regulations by geographic area or state legislature sites like <http://www.leginfo.ca.gov/index.html> or AIA at [http://www.aia.org/susn\\_rc\\_default](http://www.aia.org/susn_rc_default)

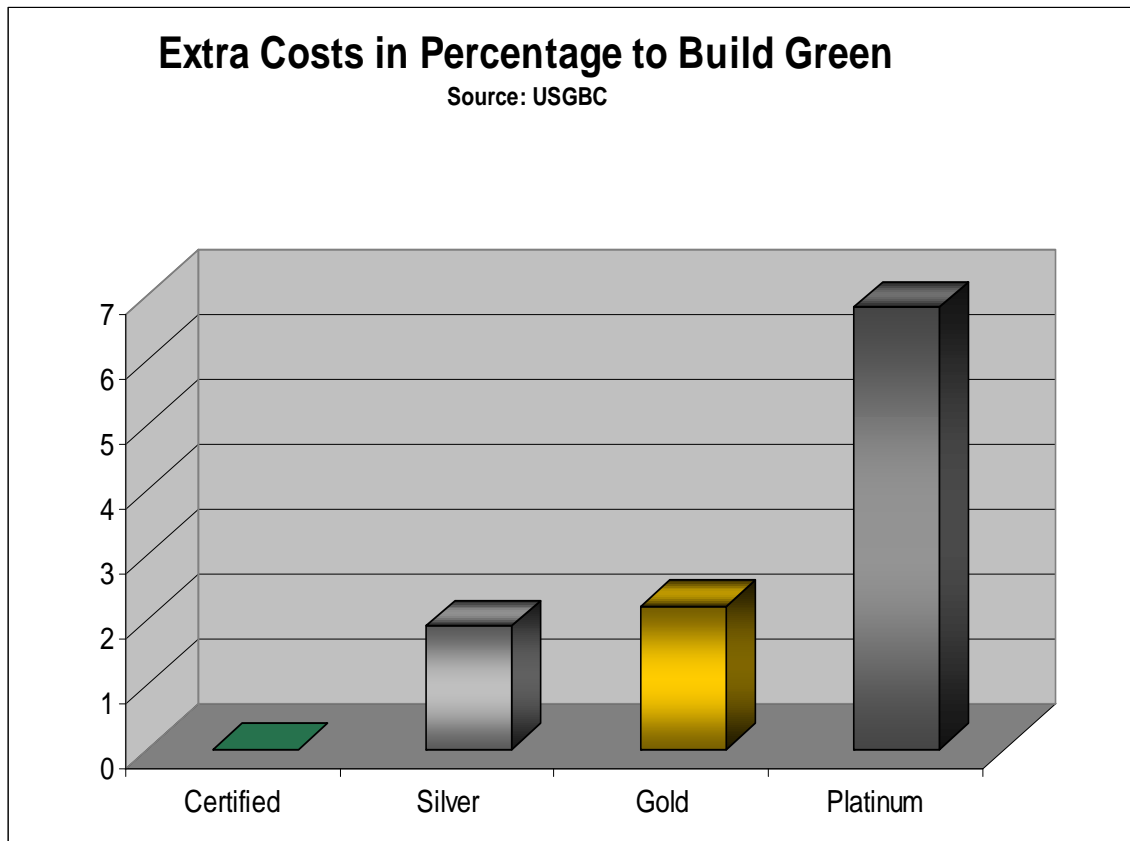
buildings.<sup>10</sup> Others will provide mandates whereby there is no choice but to become LEED certified.

Increasing mandates creates concerns among developers and owners about dependency on third party inspectors and reviewers from the USGBC. Never before in the history of the real estate industry have so many local governments been so dependent on a third party for certification of a building requirement with the exception of third party appraisers who many render opinions on value that government boards and review committees accept, reject, or revise. Here we are observing total dependency on third party certification and while USGBC seems up to the task it is unprecedented authority to delegate to a third party.

According to a survey by the American Institute of Architects, AIA, the incentives that are most effective at stimulating green building include:<sup>11</sup>

- ✓ Tax incentives, credits or rebates
- ✓ Density bonuses
- ✓ Faster building permits

**Exhibit 8: Extra Costs to Become LEED Certified as of 2007 Excluding Certification Fees**



<sup>10</sup> See Jerry Yudelson, "Green Building Incentives That Work: A Closer Look at How Local Governments Are Incentivizing Green Development", for NAIOP Research Foundation, Nov. 2007.

<sup>11</sup> Survey by AIA and the Developers Roundtable at the end of 2007. Source: [www.Metrogreenbusiness.com/news](http://www.Metrogreenbusiness.com/news)

## Exhibit 9: Extra Costs to Go Green Vary By Region

Market	Platinum	Gold	Silver
UCSB Ave.	7.8 %	2.7 %	1.0 %
San Francisco	7.8 %	2.7 %	1.0 %
Merced	10.3 %	5.3 %	3.7 %
Denver	7.6 %	2.8 %	1.2 %
Boston	8.8 %	4.2 %	2.6 %
Houston	9.1 %	6.3 %	1.7 %

Only minor efforts are required to hit LEED certification at the minimum level once the developer or owner become familiar with the process. In fact using the system in place in 2007 and 2008 many points are achievable with very modest cost.

### Green Point Strategies

Talk to several developers successful at securing LEED certification and they will tell you that with a little planning it is neither that hard nor costly to hit the minimum point total for certification, which is 26 out of 69 possible points.<sup>12</sup> Many points are easy such as designating minimal parking for low emission vehicles and facilitating bike racks. Others, such as teaching construction workers to toss waste into three different bins, are harder but feasible. Within the following categories, we see that some points are relatively low cost or costless with a little planning and education:

	Points Possible	Easy Points
<b>Sustainable Sites:</b>	14	6-7
<b>Water Efficiency:</b>	5	4-5
<b>Energy &amp; Atmosphere:</b>	17	0-1
<b>Materials &amp; Resources:</b>	13	6-8
<b>Indoor Environmental Quality:</b>	15	5-7
<b>Innovation and Design:</b>	5	1-2
<b>Total:</b>	69	<b>22-30</b>

From Trevor Jensen, USD Master of Science in Real Estate Student  
Working Paper on LEED Strategies, 2008, Burnham-Moores Center for Real Estate.

The proposed 100 point system for 2009 is an improvement in that local differences are considered and innovation is treated as a bonus with these two adding up to 10 more bonus

<sup>12</sup> We note that the new system will likely be 100 points plus 10 points for regional factors and innovation.

points. Owners and developers will still be able to game the system in that some points are lower cost than others, but the minimum standards will continue to be raised and many local governments will impose LEED certification requirements on developers of new buildings.

**Where and who are the leaders in green development, ownership and occupancy?**

While it may look like LA is the leader among all cities in greening office property, the proportion of green buildings is still less than 1% of the existing stock. Cities like Seattle and Portland are coming on strong as green leaders and even Chicago hosts over 100 buildings with green roofs as of 2008. San Francisco is requiring all new 50,000 square feet and up office buildings to be Gold LEED certified starting in 2012 and many other cities are likely to follow suit.

**Exhibit 10: Leading Metro Areas for Green as of Second Quarter 2007**

	<b>Metro Area</b>	<b># Bldgs</b>	<b>Square Feet</b>	<b>% of Total</b>
1	Los Angeles	100	26,167,038	13.3%
2	Houston	46	21,101,378	10.8%
3	Washington DC	61	19,796,646	10.1%
4	New York City	11	12,328,784	6.3%
5	San Francisco	30	11,862,367	6.0%
6	Minneapolis/St Paul	20	11,381,738	5.8%
7	Denver	34	10,285,745	5.2%
8	Seattle/Puget Sound	16	7,616,710	3.9%
9	Chicago	13	6,326,489	3.2%
10	Dallas/Ft Worth	20	6,058,892	3.1%

**Exhibit 11: Leading States for Green as of Second Quarter 2007**

	State	# Bldgs	Square Feet	% of Total
1	California	219	51,952,382	26.5%
2	Texas	91	27,942,442	14.2%
3	New York	13	12,580,084	6.4%
4	Minnesota	20	11,381,738	5.8%
5	Colorado	39	11,244,380	5.7%
6	Virginia	27	8,468,423	4.3%
7	Wash. DC	24	7,803,610	4.0%
8	Washington	17	7,649,214	3.9%
9	Florida	28	7,209,186	3.7%
10	Illinois	13	6,326,489	3.2%

**Exhibit 12: Leading Owners for Green Office Buildings as of Second Quarter 2007**

	Owner	# Bldgs	Square Feet	% of Total
1	Hines	22	12,878,213	8.5%
2	TIAA-CREF	17	5,719,217	3.8%
3	Vornado/Charles E. Smith Comm. Rea	12	4,207,716	2.8%
4	Silverstein Properties Inc.	2	3,680,076	2.4%
5	Beacon Capital Partners, Inc.	5	3,603,736	2.4%
6	The Blackstone Group	8	3,566,612	2.4%
7	Manulife Financial	7	3,509,420	2.3%
8	The Durst Organization	4	3,278,267	2.2%
9	GE Capital	15	3,093,947	2.0%
10	Maguire Properties	4	3,046,648	2.0%

**Exhibit 13: Leading Developers of Green Office Buildings as of Second Quarter 2007**

	Developer	# Bldgs	Square Feet	% of Total
1	Hines	39	26,374,642	17.7%
2	Vornado/ Charles E. Smith Commercial Rea	14	4,750,018	3.2%
3	The Durst Organization	3	2,703,267	1.8%
4	Shorenstein Company, LLC	3	2,444,010	1.6%
5	Opus Northwest Corporation LLC	4	2,346,632	1.6%
6	John Hancock Real Estate Finance Group	2	2,171,881	1.5%
7	The Durst Organization/Bank of America	1	2,118,441	1.4%
8	Trammell Crow Company	7	2,092,713	1.4%
9	Texas Eastern Corporation	2	2,086,307	1.4%
10	Maguire Properties	3	2,019,629	1.4%

**Exhibit 14: Leading Types of Tenants by Industry in Energy Star Office Buildings as of Second Quarter 2007**

	Tenant Type	# Tenants	Square Feet	% of Total
1	Financial Institutions	968	20,228,058	18.0%
2	Law Firms	822	18,407,157	16.4%
3	Retailers/Wholesalers	694	12,275,254	10.9%
4	Manufacturing	240	9,704,599	8.6%
5	Personal Services	588	7,969,667	7.1%
6	Insurance	305	7,012,850	6.2%
7	Agri/Mining/Utilities	205	6,271,296	5.6%
8	Business Services	560	5,478,659	4.9%
9	Computers/Data Processing	245	5,218,630	4.6%
10	Government	127	5,161,872	4.6%
11	Accountants	196	4,003,835	3.6%
12	Engineers/Architects	148	3,876,718	3.4%
13	Real Estate	367	2,215,196	2.0%
14	Communications	98	1,603,219	1.4%
15	Medical	178	1,516,067	1.3%
16	Transportation	70	1,465,971	1.3%
	<b>Grand Total</b>	<b>5,811</b>	<b>112,409,048</b>	<b>100.0%</b>

**Will Tenants Pay More?**

The GSA (Government Services Administration) has no choice but to embrace Energy Star and LEED certified buildings and has required as much. By 2010 all GSA procured space will be Energy Star rated. Many other public and private companies have proclaimed intentions to go green but have found it difficult to do so. Among these are PNC, Cisco, Toyota, IBM, DHL, PepsiCo and others. Below in Exhibit 15 we define a green building as either Energy Star rated or LEED certified at any level. All of the tenants listed below have had sustainable business mission statements since mid 2005, yet not all have been able to secure green space or have been willing to pay for it. The vicious cycle we sometimes hear is that developers claim they can not get rent premiums and tenants don't demand green space while tenants claim it does not exist or they would demand it.<sup>13</sup>

When asked at a NAIOP 2008 Green Conference in Phoenix if they would pay more for a green building the tenants uniformly said, "No". But, when asked if they would pay the same for a non-green building all said they would pay less. This is antidotal but we see that how questions are framed will affect the research conclusions.

<sup>13</sup> Nico Rottke, PhD. European Business School, San Diego Speech July 1<sup>st</sup>, 2008.

## Exhibit 15: Tenants With Sustainable Business Goals and the Percentage of Green Building Deals from March 2006 through March 2008

Tenant	Green Leases	Green SF	Non Green Leases	Non Green SF	% Green SF
CB Richard Ellis	13	123,188	42	421,528	23%
Wells Fargo & Co	9	69,378	66	844,821	8%
BHP Billiton	7	<b>454,381</b>	0	0	<b>100%</b>
Wachovia Corporation	6	99,895	65	770,198	11%
U.S. General Services Administration	6	345,469	50	2,691,310	11%
The Travelers Companies, Inc.	6	<b>285,695</b>	7	<b>43,103</b>	<b>87%</b>
Goodrich Petroleum Corporation	5	<b>8,031</b>	0	0	<b>100%</b>
Citigroup, Inc.	5	89,249	93	948,606	9%
Citizens Financial Group, Inc.	5	112,746	17	119,248	49%
StatOil	4	<b>124,798</b>	0	0	<b>100%</b>
California Transplant Donor Network	4	<b>21,512</b>	0	0	<b>100%</b>
County of Los Angeles	4	78,978	6	106,888	42%
State of California	4	86,463	22	315,110	22%
University of Southern California	4	<b>39,757</b>	0	0	<b>100%</b>
Principal Life Insurance Company	4	25,504	4	56,713	31%
TGS-Nopec Geophysical Company, L.P.	4	<b>35,211</b>	0	0	<b>100%</b>
The Staubach Company	4	39,903	7	149,119	21%
Pay By Touch	4	92,936	1	23,984	79%
Liberty Mutual Group, Inc.	4	57,705	31	333,488	15%
Career Education Corporation	4	126,608	4	87,130	59%
Jones Lang LaSalle Americas, Inc.	4	24,259	14	142,769	15%

Source: CoStar

### Conclusions

Green does pay off. As of 2008 there is such a shortage of green buildings available to those who demand green space that

Contrary to popular opinion, the green movement is not purely public sector-driven, although we do note a large number of cities now mandating LEED certification for certain sized buildings, usually 50,000 square feet and up by the year 2012<sup>14</sup>. Tenants like the EPA and others within the Federal government are important drivers but so is the typical public corporation today. The more typical tenants asking for energy star ratings, LEED certification or high performance building features are private market-based firms. They may not admit to a willingness to pay more for green but they will pay less for non-green. We do not always find rent premiums for green buildings in all cities but there is on average a premium and in those cities where no rent differentials exist there is antidotal evidence of faster absorption.

Private developers are leading the way in accommodating this burgeoning demand. Some investors like CALPERS have recently announced efforts to increase their emphasis on green over the next several years. Several cities, like Boston, LA or San Francisco, have mandated LEED certification, while others, like Toronto, have provided incentives (i.e. rebates) for energy conservation methods. A great local incentive which costs cities very little but saves developers significant money is the promise of faster entitlement and permit reviews and or reduced permit

<sup>14</sup> For example Los Angeles will require LEED certification by 2012 while San Francisco will require Gold LEED certification for office buildings of 50,000 square feet or more.

fees or bonus densities.<sup>15</sup> We need more studies on the best practices and this paper is intended in part as a call for more research. Among the research most needed are new measures and test of productivity changes as a function of the building type and amenities. We also need new measures for building efficiency in terms of reconfiguration as internal space needs change. None of the current measures as used in Europe or the US or Asia do a good job of capturing life cycle benefits not reconfiguration savings from more sustainable buildings.

Related to the is need for more research we provide the call for papers for a new monograph and potential journal on sustainable real estate sponsored by CoStar and managed by the American Real Estate Society in Appendix 3.

The real barriers to go green are mostly a lack of planning and developer education, a lack of knowledge about local vendors and resources or difficult local land use officials. Included in this are those who only work to improve business practices when competition forces them to do so—the “Who Moved My Cheese?” mentality.”<sup>16</sup> Culture plays a role as well and we observe more environmental leadership in Europe and even Asia. Still the USGBC has become a new world leader and standard bearer. As such we hope that LEED standards continue to evolve.

A common argument against going green is that tenants are unwilling to pay for it. Some green building owners decide not to bother with certification as the costs is seen and exceeding the benefit. We note that with the increasing reliance of cities on LEED certification systems and the USGBC it will likely take longer in the future to become certified with the back log that may occur. We also note that the process of becoming certified will change and could easily become more difficult over time. Those who are risk averse should consider going through the process before the scoring system changes and becomes more difficult.

There remain real economic barriers to progress. When property managers are paid extra administrative fees on passed through common area utility costs, they have fewer incentives to want to encourage energy savings. Also problematic are typical expense-pass-through net leases that do not balance out the increased rent necessary to support higher initial building and design costs with the gains that will supposedly accrue but cannot be guaranteed. Benefits from more flexible and adaptable buildings are finally starting to become known as well as energy savings. We are starting to find less skeptical tenants willing to believe claims of potential benefits. This is borne out by higher base rents. Still, many public companies are starting to initiate and support resource and energy conservation policies, and if they are serious, they should be willing to seek out more environmentally friendly buildings. We are now witnessing the evidence of such trends and those buildings that do not reflect more efficient operating abilities will become obsolete much faster.

What is needed most is market transparency and better information along with measurement standards that can be agreed upon domestically if not globally. LEED is a good start, but we

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<sup>15</sup> Costa Mesa, CA and others have adopted such incentives. See DSIRE, the Database of State Incentives for Renewables and Efficiency at

<http://www.dsireusa.org/library/includes/incentiveupdated.cfm?&CurrentPageID=3&EE=1&RE=1>

<sup>16</sup> “Who Moved My Cheese?” is the story by Spencer Johnson, 1998 Putnam Pub, where personalities of self-satisfied mice were compared to those who wanted to manage risk and do research while ample food supplies existed.



need more specific ratings on energy consumption similar to what is used on refrigerators, washing machines and even for cars with respect to fuel consumption. After such ratings become known, they affect behaviors and values with more certainty. We need such a rating system for energy consumption along with systems that provide information on building adaptability and resource impact. For example, how easily the building parts can be recycled or how easily it can be re-configured for accommodating occupancy changes. Soon we may see large property owners with green self-sustaining solar-powered mixed use developments selling off carbon credits to others. Until then more research is needed.

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## **Appendix 1: Defining Green, Sustainable, Intelligent and Secure Buildings**

**BREEAM:** Started in the UK. BREEAM Buildings can be used to assess the environmental performance of **any** type of building (new and existing). Standard versions exist for common building types and less common building types can be assessed against tailored criteria under the Bespoke BREEAM version. Buildings outside the UK can also be assessed using BREEAM International. For example, there are BREEAM assessment methods for schools, industrial buildings, retail buildings, homes, offices, prisons and much more. See <http://www.breeam.org/index.jsp>

**CABA:** Continental Automated Buildings Association, based in Ottawa, Canada. CABA is a not-for-profit industry association that promotes advanced technologies for the automation of homes and buildings in North America. CABA encourages the development, promotion, pursuit and understanding of integrated systems and automation in homes and buildings.

**CASBEE:** To be nationally authorized in Japan, a cooperative academic, industrial and governmental project has been to establish a new system called the Comprehensive Assessment System for Building Environmental Efficiency (CASBEE). See <http://www.ibec.or.jp/CASBEE/english/index.htm>

**Green:** A term applied to practically everything in which energy savings and resources are conserved or re-used. More specifically, it is related to the LEED rating provided by the U.S. Green Building Council (USGBC) or the “Energy Star” rating provided by the U.S. Environmental Protection Agency (EPA). Many other measurements of green exist around the world, but none measure building productivity as of 2008.

**Green Globe:** The Green Globes system is a building environmental design and management tool. It delivers an online assessment protocol, rating system and guidance for green building design, operation and management. The genesis of the system was the Building Research Establishment's Environmental Assessment Method (BREEAM). The Green Globes system is used in Canada and the USA. In the USA, Green Globes is owned and operated by the Green Building Initiative (GBI). In Canada, the version for existing buildings is owned and operated by BOMA Canada under the brand name 'Go Green' (Visez vert). The Green Globes system has also been used by the Continental Association for Building Automation (CABA) to power a building intelligence tool, called Building Intelligence Quotient (BiQ). In 2004, Green Globes for Existing Buildings was adopted by the Building Owners and Manufacturers Association of Canada (BOMA), where it operates under the name Go Green Plus. In addition, the Green Building Initiative (GBI) acquired the rights to distribute Green Globes in the United States. In 2005, GBI became the first green building organization to be accredited as a standards developer by the American National Standards Institute (ANSI), and began the process of establishing Green Globes as an official ANSI standard. The GBI ANSI technical committee was formed in early 2006. See <http://www.greenglobes.com/>

**Green Star:** Started by the Green Building Council of Australia in 2002, the GBCA is a national, not-for-profit organization that is committed to developing a sustainable property industry for Australia by encouraging the adoption of green building practices. It is uniquely supported by both industry and governments across the country. Its key objectives are to drive

the transition of the Australian property industry towards sustainability by promoting green building programs, technologies, design practices and operations as well as the integration of green building initiatives into mainstream design, construction and operation of buildings. See <http://www.gbca.org.au/>

**Energy Star:** In 1992, the U.S. Environmental Protection Agency (EPA) introduced Energy Star as a voluntary labeling program designed to identify and promote energy-efficient products to reduce greenhouse gas emissions. A few years ago, the EPA extended the label to cover new homes and commercial and industrial buildings. Those rated as among the most 25% energy efficient are given the Energy Star rating. Over time, this rating should become more difficult to achieve since it is a relative score as opposed to an absolute score like the LEED ratings.

**LEED:** LEED is a product of the U.S. Green Building Council. It stands for Leadership in Energy and Environmental Design and applies to the design, building materials used and operation of the building. Points are awarded for sustainability, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality and design innovation. It is intended as a hurdle that only 25% of existing buildings will pass at the certified level with little additional cost. Higher point scores can result in Silver, Gold and Platinum ratings. Over time, LEED point systems will be revised. Categories that can achieve ratings include new construction, existing buildings, commercial interiors, core and shell, homes or even neighborhood developments.

**Sustainable:** A system that on a “net” basis does not deplete resources. With respect to sustainable development, the focus includes all those elements common to green buildings, as well as sites that are sustainable with indigenous plantscaping, capturing “gray” water that has been used and rainwater, and designed to minimize transport costs. Mixed-use developments where people can work, live, go to school and play are a natural extension of sustainable development. Two good examples are Stapleton, Colo. (See <http://www.stapletondenver.com/>) and Birkdale Village, in north Charlotte, N.C. (See <http://www.birkdalevillage.net/welcome.htm>)

**Intelligent:** The term for an adaptable building that is likely green and also easy to retrofit or remodel for changing internal configurations and uses (also known as a **High Performance Building**). Such buildings have longer economic lives and cost much less to occupy. Typical elements of an intelligent building are modular floor units, removable walls, under floor venting and wiring for phones and data, motion sensor cameras and much more all on whips that are easy to re-configure. Back-up systems may include several sources of power and generators with battery back-ups and safe air/water storage systems. An example of an intelligent building would be ABN AMRO in Chicago (See <http://www.hines.com/property/detail.aspx?id=156> or <http://www.buildings.com/articles/detail.aspx?contentID=2128>. See also <http://www.intelligentbuildingstoday.com/> and <http://www.caba.org/index.html>.)

**Secure Buildings:** After Sept. 11, 2001, a number of new security measures came to be in many buildings. Some of these features include access control for visitors and maintenance staff. Other features include surveillance, back-up power, air, water and emergency plans. Secure buildings have several redundant systems. Secure buildings may be intelligent, but are not always green.

**USGBC:** The U.S. Green Building Council (USGBC) is a non-profit composed of leaders from every sector of the building industry working to promote buildings that are environmentally responsible, profitable and healthy places to live and work. More than 11,000 member organizations and 75 regional chapters are united to advance the mission of transforming the building industry to sustainability. (See <http://www.usgbc.org/>)

## Appendix 2

### Exhibit A-1: The Financial Benefits of Going Green are Mostly Related to Productivity

## Financial Benefits of Green Buildings Summary of Findings (per ft<sup>2</sup>)

Category	20-year Net Present Value
Energy Savings	\$5.80
Emissions Savings	\$1.20
Water Savings	\$0.50
Operations and Maintenance Savings	\$8.50
Productivity and Health Value	\$36.90 to \$55.30
<b>Subtotal</b>	<b>\$52.90 to \$71.30</b>
Average Extra Cost of Building Green	(-3.00 to -\$5.00)
<b>Total 20-year Net Benefit</b>	<b>\$50 to \$65</b>

*Source: Capital E Analysis*