

## Does Green Pay Off?

By Norm Miller, Jay Spivey and Andy Florance<sup>1</sup>  
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**Abstract:** In this preliminary study and call for further research we provide some comparison data on energy star versus non-energy star rated office property from the entire US using CoStar data. These results are promising for the benefits of investment in energy savings and for the green movement now sweeping our society. In the appendix we provide some definitions as well as a call for research for a new monograph on sustainable real estate.

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## Preface

With all the talk of green these days, it is easy to feel like we will soon all be mandated to maintain compost piles in our backyards and hug a tree daily or become outcasts. It is like America suddenly woke up to the fact that our resources are finite and our demands infinite. Chalk this up to some good leadership by the USGBC (U.S. Green Building Council) as well as inspirational books and talks by experts like Bill McDonough of “Cradle to Cradle” fame.<sup>2</sup> Appendix 1 to this paper includes some definitions to help novices can sort out the various political forces and perspectives coming to bear on this tsunami of new environmental and efficiency concerns. Appendix 3 provides a call for papers and possible questions in need of more definitive answers.

## Introduction

Here we reveal the first systematic study, as opposed to case studies, that addresses questions on the benefits of investments in energy savings and environmental design. We compare all USA based Energy Star office buildings, many of which are LEED certified, with a large sample of non-Energy Star rated buildings. Essentially, Energy Star buildings are those within the 25% most efficient buildings for energy conservation. We are now in the process of expanding this study to include more control variables and better refine the impact of green efforts on value. Specifically, we plan to include a review of various LEED certifications on the variables examined here including operating expenses, rents, occupancy rates and most important to the developers, market value. To date, most studies on the benefits of green investment are case studies. 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.

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 bias. Developers point out the high indirect costs of dealing with inflexible, uninformed and uncooperative local building code regulators or the lack of local experts and resources. These costs 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 on this same pattern. Here we will lay out what we know from reliable resources and data.

We 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. 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

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<sup>2</sup> See [http://www.mcdonough.com/cradle\\_to\\_cradle.htm](http://www.mcdonough.com/cradle_to_cradle.htm). *Cradle to Cradle* by William McDonough and Michael Braungart, North Point Press, 2002.

recent years have tenants started to fully appreciate the benefits of cleaner air, more natural lighting and easier to modify spaces. 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. Here we focus on the more direct real estate benefits and we do it on a sample including most of the 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 late 2007, there were nearly 1200 Energy Star-rated buildings in the database with 893 office buildings, 218 retail, 22 industrial, 53 hospitality and 12 others. 580 buildings in the data based were LEED certified but the sample available to 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:

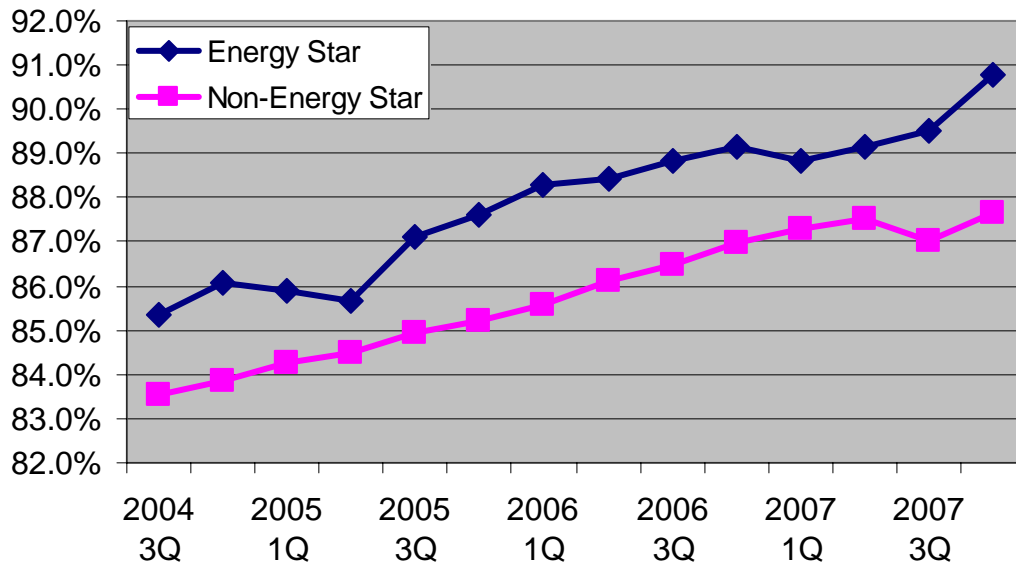
- ✓ Only Class A office buildings
- ✓ 200,000 square feet or more
- ✓ 5 stories or more
- ✓ Built since 1970
- ✓ Multi-tenanted

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.

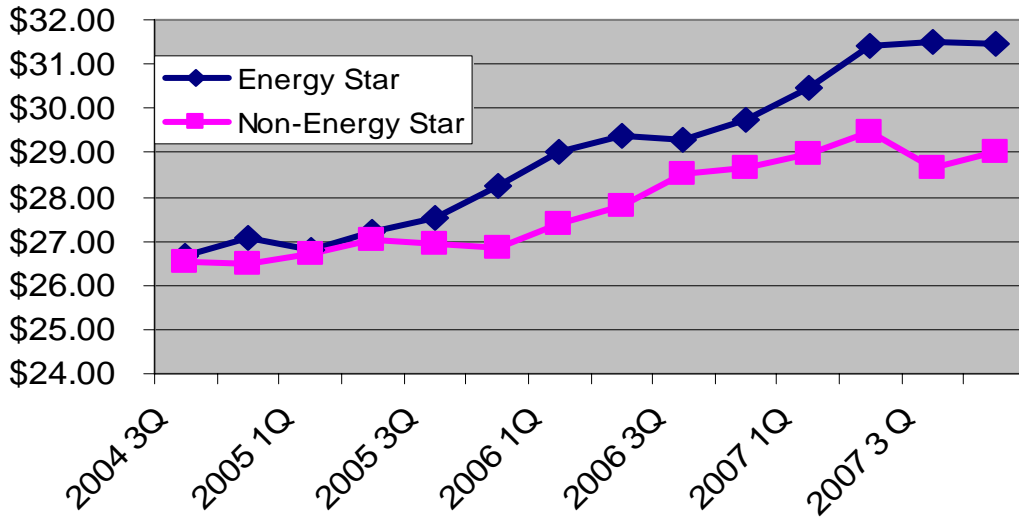
## **Preliminary Results**

Data comparison results are provided in five Exhibits as follows:

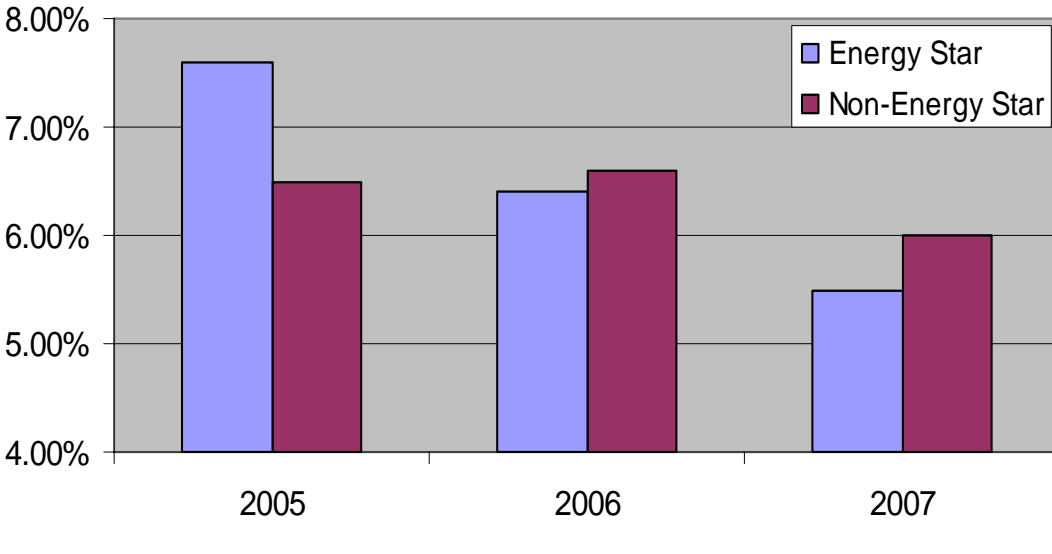
**Exhibit 1: Occupancy Rates By Qtr Through 2007**

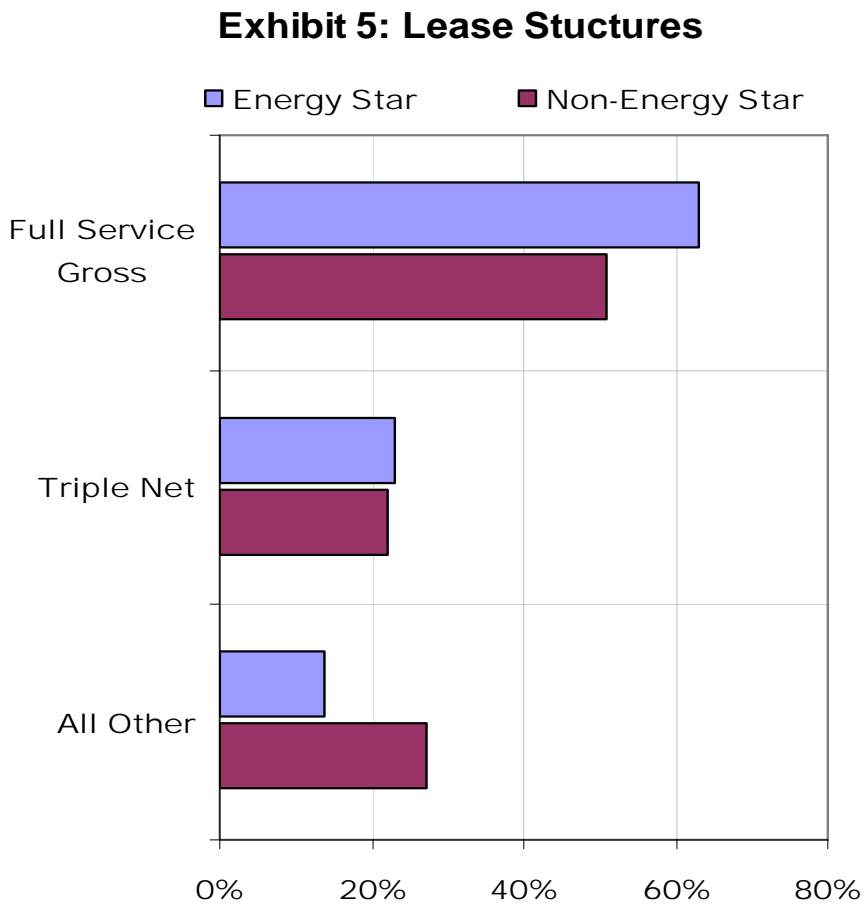
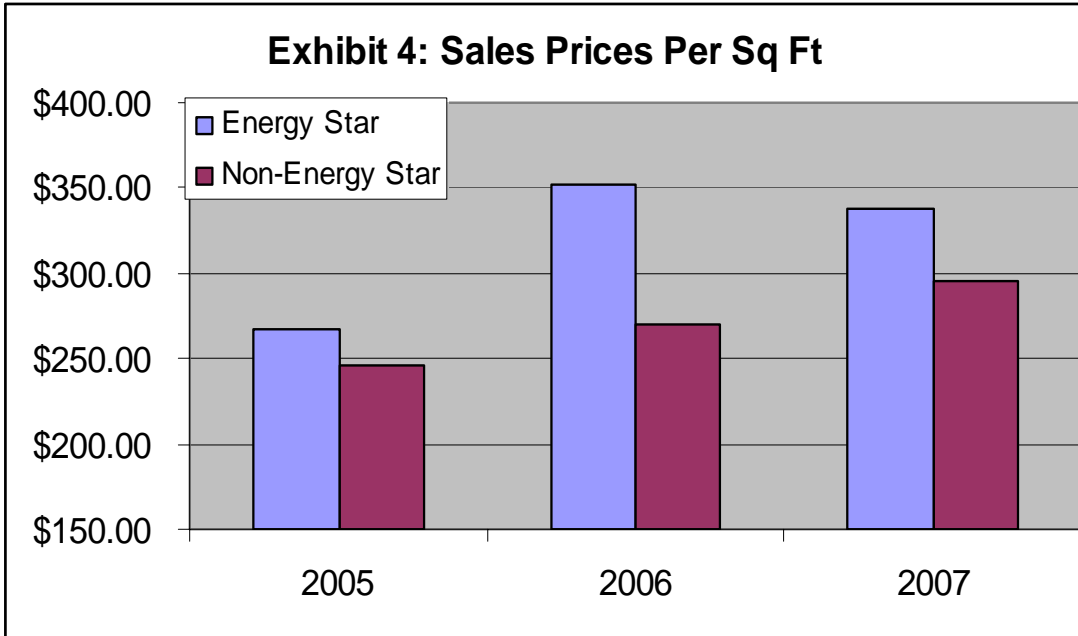


**Exhibit 2: Direct Rental Rates Through 2007**



**Exhibit 3: Cap Rates**



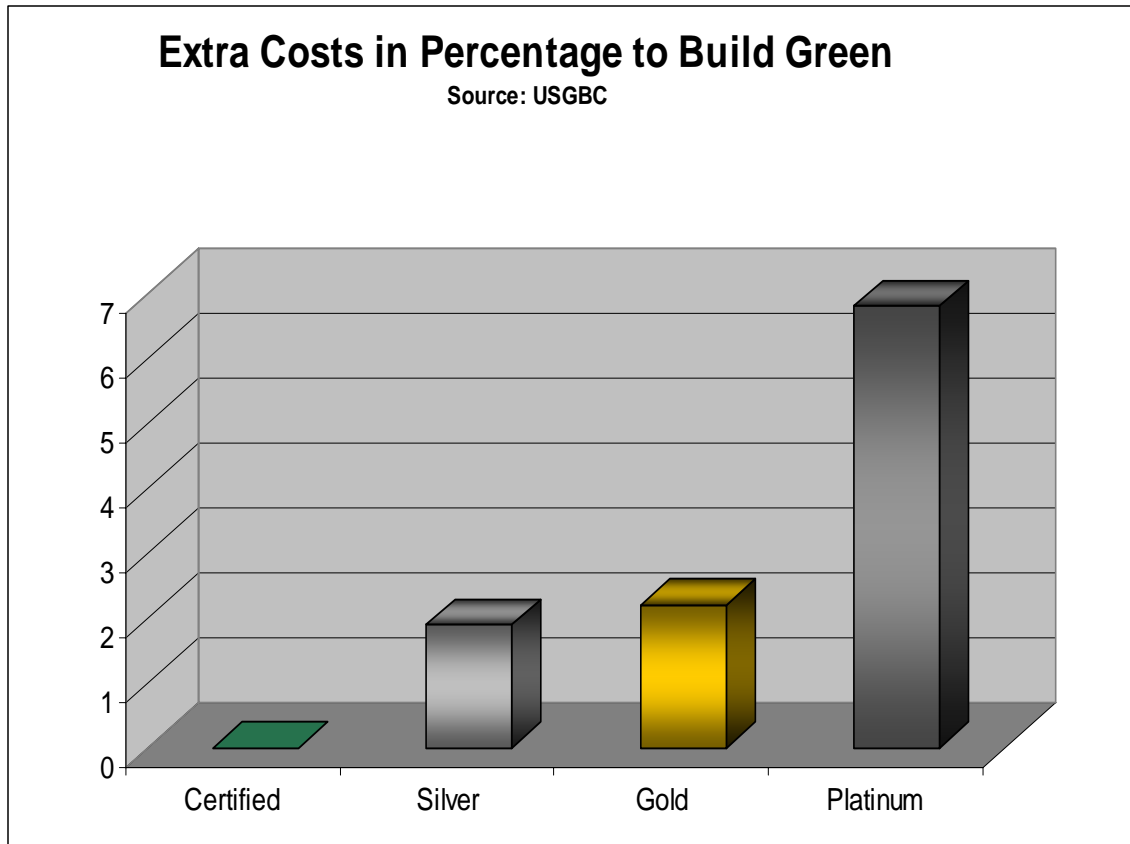


Operating expenses from energy costs also varied with Energy Star-rated buildings running \$1.27 per square foot per year for energy in 2006 and non-Energy Star-rated buildings running \$1.81 per square foot. Together, the higher occupancy rates, higher rents and lower operating expenses translate to significantly higher values. Our results show higher sales prices by nearly 15% more per square foot, although the short history of data suggests that this alone is not definitive but certainly very encouraging for investing in energy savings. Based on 2006 data the premium for energy star property was close to 30%, suggesting significant noise in the estimate and the need for more control variables. The sample of properties where cap rates were known is modest but we observe a differential in terms of lower cap rates suggesting higher values by approximately 10%.

### **Extra Costs 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 6 and 7) and anecdotal surveys. While the Energy Star rating does not equal LEED certification, we suggest that silver certification is a reasonable proxy for the extra costs, at least until more data can be derived. 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. With silver at 2.5% extra, plus the 3% as reported by developer surveys, we are still only at 5.5%. In any case it is very likely that the value benefits exceed the direct extra costs for energy star ratings and we speculate that LEED certification will also show net value gains. Considering that most of the benefits are not energy savings but occupancy benefits and going green becomes more than compelling.

**Exhibit 6: Extra Costs to Become LEED Certified as of 2007**



**Exhibit 7: Extra Costs to Go Green Vary By Region**

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

Again, while LEED certification does not equate Energy Star ratings, there is a correlation and over time it will become more difficult to make the Energy Star rating since the rating is relative, not absolute. Yet, we have clearly observed that minor efforts are required to hit LEED certification at the minimum level, and Silver or Gold ratings are more likely to be needed to



achieve really efficient and user friendly buildings, which may also be high performance adaptable buildings. This strategic perspective for achieving LEED certification is further explored below.

### 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 60 possible points. 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.

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

**Exhibit 8: Leading Metro Areas for Green as of Second Quarter 2007**

	Metro Area	# Bldgs	Square Feet	% of Total
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 9: 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 10: 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 11: 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 12: 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>

### Conclusions

Contrary to popular opinion, the green movement is not purely public sector-driven. 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. 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 or San Francisco, have mandated LEED certification, while others, like Toronto, have provided incentives 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. We need more studies on the best practices and this paper is intended in part as a call for more research. In fact in Appendix 3 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.

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>3</sup> Culture plays a role as well and we observe far more environmental leadership in Europe and even Asia. Inexperience plays a role and just learning where to find the resources to “go green” are a significant hurdle for many newly

<sup>3</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.

curious developers. Yet, most who have successfully navigated their way through the process of going green becomes a convert and no longer sees it as difficult. There are cynics about the benefits relative to costs but even Louis Pasteur<sup>4</sup> had to prove repeatedly that immunization was possible against viruses while the prevailing medical community resisted all progress until overwhelming evidence was provided.

There are 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. Perhaps 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 really needed 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 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. Some day 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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<sup>4</sup> Louis Pasteur 1822-95 French chemist who developed the germ theory and learned how to mitigate bacteria and viruses including the first rabies vaccine and vaccines against anthrax.

## References

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

**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.

**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).

**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*





## Appendix 3:

### Call for Papers Special Issue on Green Buildings and Sustainable Real Estate Real Estate Monograph Series Submission Deadline: May 15, 2009

The American Real Estate Society, in cooperation with and funding by the CoStar Group, announces a call for papers for a special issue of the real estate monograph series on “green buildings and sustainable real estate” The best research paper published will receive a \$15,000 honorarium. All papers accepted for publication will receive \$1,000. Authors are encouraged to submit original research that can help investors, developers, appraisers, lenders, asset managers, elected government officials and land use regulators improve their strategies, decision-making and understanding of the impact of sustainable real estate practices. Topics and questions of interest include, but are not limited to, the following:

#### Philosophical and Definitional

- What is a “green building” and/or a “sustainable development”?
- Who should set the standards and what types of measurement systems should be used?
- What does green or sustainable real estate mean around the world and how is it measured?
- What can we learn from some of the global thought leaders about sustainable real estate?
- 

#### Regulatory Issues

- Nearly every major city and several states now require LEED certification for certain types or sizes of buildings. How do these requirements compare and can we learn anything from some of the incentive systems versus requirement systems in terms of effectiveness and efficiency?
- Some states like California have emission limits and energy efficiency standards or water limitations that are being phased in over time. What is the impact on building cost of such programs and how much impact on energy consumption and carbon emissions will they have?
- Some countries use rebate systems and tax credits for utilities or green features. How have such programs impacted the return on investment for energy savings and or co-generation via solar or other means?
- Are there “carrots” or “sticks” that work well? What are the effects of these subsidies, taxes or other incentives on the return on investment for green development?
- 

#### Financing and Valuation Issues

- Are there or should there be financing incentives for green buildings and sustainable development? How do you value a building with green features? Are benefits imbedded in rents and occupancy or expenses, or is there an impact on risk that should affect required returns? How do lenders view the costs and benefits of green?
- What are the implications of the green and sustainable movements for appraisers and the appraisal process?
- How and what are the observable value effects of green and sustainable development?

#### USGBC’s LEED Program, CABA, Energy Star, and Hi-Performance Building Systems

- How are the standards evolving for measuring important dimensions of building performance? Should we have a required disclosure system for building performance like Energy Star for appliances, but on broader issues of concern?
- Are there conflicts with state and local building codes and municipal subdivision and site conditions that make implementation difficult? Is land use and building code official education an issue?
- What is the impact of green buildings on worker productivity and morale, retail sales, and benefits that go beyond energy savings? Can these be valued? Do they or will they eventually translate into rent?
- Does solar pay off? Will real estate owners trade carbon credits some day?

#### Green and Sustainable Strategies and Policies

- How many public and private companies have green policy statements? How has this affected real estate decisions?
- Portfolio approaches to energy consumption: Are carbon credits possible for larger scale developments and portfolios?
- What are the new technologies and strategies affecting water consumption? Are they cost effective?
- Who is defending the status quo? Why?
- Who is or should be developing new products?
- 

#### Case Studies of Innovative Properties, Products, Design or Management Strategies

- What are the lessons learned? Good examples of bad practices? Good examples of good/best practices? Great resources?

1. All papers will be subject to anonymous double blind review by practicing professionals and academicians.
2. Articles must be written to be understandable by institutional real estate investors; lengthy formulas and mathematics should appear in an appendix. Applied empirical studies will be given preference. Early submissions are greatly appreciated.
3. Style guidelines are available in the back of all JRER issues and on the ARES web site [www.aresnet.org](http://www.aresnet.org).
4. Submissions are preferred in MS Word or PDF format.

Special Issue Co-Editors: Norm Miller, Editor, University of San Diego and Daniel Kohlhepp, Co-Editor Crescent Resources.

Authors should submit their manuscript no later than, May 15, 2009 to Norm Miller via email at [nmiller@sandiego.edu](mailto:nmiller@sandiego.edu) or mail to University of San Diego, Burnham Moores Real Estate Center, 5998 Alcala Park, San Diego, CA 92110-2492.