Recent research in the Real Estate academic community has brought a focus to the quantitative and financial aspects of the environmentally conscious—or "Green"—movement in property construction and management. A number of articles have been published in the leading academic journals in the field or have been presented at the primary academic conferences.

These studies have addressed issues such as the types of eco-certifications available, the market effects (rents, selling prices, occupancy levels, capitalization rates, risk) of such certifications, the role of appraisers with respect to green buildings, strategies for responsible property investing, and the market effects of various issues like community gardens and tree-planting programs.

The overall theme of the research findings is that sustainable property development and operation, while still a relatively minute segment of the real estate market, is providing returns above the added costs of going green. Although numerous limitations have kept the total numbers of market participants down currently, the trends are pointing toward continued growth in environmentally friendly real estate.

Review of Research

The following summaries provide a snapshot of several of these recent studies. All of the papers were published or presented in the last two years. Prior to this, the academic
papers tended to focus on the theoretical aspects of or strategies for sustainable development. The reviews of the studies are listed alphabetically by lead author:

- The number of "Leadership in Energy and Environmental Design" (LEED) designated building doubled in 2008 (Biblow 2009). LEED certified buildings must follow stringent construction and maintenance procedures, as outlined by the U.S. Green Building Council. The factors contributing to the increase include more efficient energy use and lower operating costs, governmental pressure and regulations, and heightened environmental awareness by tenants.

- The levels of LEED and ENERGY STAR certifications were found to have an effect on Assessed Values (AV) and Market Values (MV) of office buildings (Dermisi 2009). These effects differed whether the properties were certified as new construction or as existing buildings, and whether the ratings were at the Gold or Silver levels. Note, however, that the study analyzed only the values of buildings that were rated and did not compare rated properties with non-rated properties.

- Rental rates and selling prices for office buildings with LEED and ENERGY STAR ratings were higher than for otherwise similar properties, ranging from approximately 3% for rent to 16% for sales prices (Eichholtz, et al 2009). The rent premiums were even higher—at 6%—after adjusting for building occupancy levels. The rent and selling price differences were found to be larger in locations with lower prices. In addition, these premiums were systematically related to the level of energy efficiency
of the buildings, as a 10% decrease in consumption brought an additional 1% increase in value.

- Research indicated that eco-certified (LEED and/or ENERGY STAR) office buildings had rent premiums and selling price per square foot premiums compared to non-certified buildings built at similar times, but that the time on the market were not significantly different (Fuerst 2009). With new LEED certification parameters released in 2009, the outlook for continued growth of rated properties is strong.

- In a pair of studies, office building which were eco-certified had higher occupancy levels as well as rent premiums and selling price per square foot premiums compared to non-certified buildings after controlling for various building characteristics (Fuerst and McAllister, "Effect of Eco-Labeling" 2009; Fuerst and McAllister, "New Evidence" 2009). Occupancy levels were found to be 8% higher for LEED designated and 3% higher for ENERGY STAR rated offices, the differences attributable mainly to the varying characteristics between LEED certified buildings and ENERGY STAR certified buildings (ENERGY STAR buildings are characteristically larger, taller, and multi-tenant while LEED buildings are more diverse). Similarly, the researchers found through a series of models that eco-certified offices rented from 3% to 6% higher than non-rated offices and sold for 30% to 35% higher.
Using Monte Carlo simulation techniques, LEED and ENERGY STAR designated buildings were deemed less risky than similar non-rated buildings (Jackson 2009). The researchers developed internal rate of return (IRR) estimates derived by applying occupancy and rent premiums certified buildings enjoy (as found in previous studies) together with the additional building cost considerations that certification requires. Then, they applied Monte Carlo analysis to determine the risk probabilities of eco-certification. The results indicated IRRs for LEED rated buildings averaged more than 125% with a 10% probability of achieving 50% or lower IRRs. ENERGY STAR rated properties were even more favorable, with average IRRs of 140% and less than 2% probability of 50% or lower IRRs.

While the evidence for price premiums for eco-designated properties is beginning to be collected, the data is generally not to the level yet that is actionable by real estate appraisers, and thus may not be reflected in market value and investment value appraisals (McAllister 2009). Proponents of eco-certified properties have criticized appraisers for not applying a premium to the certification. Appraisers, however, are trained to value properties based on market data. While the number of certified properties is increasing, it is still a minuscule segment of the market. The researcher comments that this problem may resolve itself as more data becomes available.

Eco-certified office buildings were found to have numerous financial advantages over non-green buildings (Miller, et al 2008). These included: lower operating costs ($1.27 per square foot for ENERGY STAR rated buildings compared to $1.81 for
non-ENERGY STAR buildings); lower capitalization rates (55 basis points); higher occupancy rates (92% versus 88%); higher rental rates (approximately $2.50 per square more for ENERGY STAR rated offices); and, higher selling prices per square foot (6% more for ENERGY STAR rated properties and 10% for LEED rated properties). On the hand, the researchers found slightly higher marginal costs for building developers related to eco-certification—ranging from 1% to 4% for Silver-level ratings to 8% to 10% for more stringent Platinum-level ratings, depending on geographic location—but conclude these costs were more than offset by the higher occupancy and rent and value premiums. Finally, the leading metro areas for eco-certified buildings in terms of include total building square footage were Los Angeles, Houston, Washington, D.C., New York City, and San Francisco, with Dallas/Ft. Worth ranked tenth. Texas was the second-highest ranking state behind California.

- Responsible property investing (RPI) strategies were found to have increased investment returns (Pivo 2008). The ten strategies can be categorized as either no cost approaches or value added approaches, and include the following: energy conservation; environmental protection; voluntary certifications; public transport-oriented developments; urban revitalization and adaptability; health and safety; worker well-being; corporate citizenship; social equity and community development; and, local citizenship.
Neighborhood community gardens had a statistically significant effect in raising property values of nearby residential properties in New York City (Voicu and Been 2008). The impacts were highest in properties immediately closest to the gardens but were still significant up to one thousand feet away. In addition, the impacts increased over time. Interestingly, the effects were strongest in lower-income census tracts than in relatively higher income areas. The researchers hypothesize that part of the impact was due to the lots on which many of the gardens were located being "disamenities" to the neighboring properties prior to the creation of the gardens, often "vacant, rubble-strewn sites that were havens for crime". However, the researchers note that the property value effects of the gardens did not change regardless of the amount of open space in the neighborhoods.

The contributing value of a community tree-planting program on residential properties was estimated to range from 7% to 10% (Wachter and Wong 2008). The impact was evidenced for more than 1,000 feet away from the location of the planting. The researchers conclude that the intrinsic value of the trees themselves brought a 2% increase in subsequent selling prices, but that the bulk of the impact was due to a signaling effect of previously unknown characteristics of the residents (or "social capital"), and especially the aspect of coordinating "with each other to achieve an aim or an increase in social awareness that benefits other residents". A second part of the study notes that the effect was not statistically significant in a program that targeted lower income neighborhoods.
Conclusion

All of the above research indicates that the green building movement has spread into the mainstream of the real estate community, at both the academic and professional levels. In fact, one of the leading real estate practitioner database firms (CoStar Group, Inc.) recently launched a new academic journal entitled *The Journal of Sustainable Real Estate* in order to further merge these trends. These studies represent first—but necessary—steps in quantifying the value and importance of developing and operating buildings with green methods. While additional research is necessary and will continue to be compiled; these early findings move the discussion past the theoretical and ideological realms and into the practical world of the market.

Works Cited


