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The Greening of U.S. Investment Real Estate – Market Fundamentals, Prospects and Opportunities

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With global warming suddenly emerging as a mainstream policy concern, businesses are finding that “sustainability” is rapidly transforming from a fringe “feel-good” issue into an exigent agenda item requiring focused, top-level action. The past year has seen companies across a wide range of industries virtually race to adopt and implement environmental policies, as market forces compelling action outpace regulatory requirements. And with standards of corporate accountability changing almost as rapidly, stakeholders and other constituencies are demanding that firms recognize and act on issues far removed from their core business lines – including the environment.

As a major user of natural resources, the real estate sector stands as a focus of global efforts to reduce the “carbon footprint” of economic activities. Here, too, the movement to green policies seems to have gained traction with startling speed, though in reality, the forces propelling the “greening” of real estate have been mounting for at least a decade. Some real estate practitioners have long advocated greener approaches to how and where property is developed and operated, but a new paradigm seems to have reached a critical mass of awareness and action just in the past year. Industry publications, conferences and popular press are suddenly filled with accounts of how developers can and are producing more environmentally-friendly “high-performance” buildings. The near ubiquitous motto: “green is green” (*i.e.*, environmentally-friendly policies can be profitable).

Yet most of these advances are occurring without the direct involvement of major institutional real estate investors in the United States. While the real estate community has been proactive on environmental issues elsewhere around the globe, particularly in Europe, Australia and Japan, the green real estate movement in America has been incubating largely in the public and corporate sectors, which today own and occupy the vast majority of the green buildings constructed to date. Not for long.

This paper explores the factors behind this disparity, and speculates on why the U.S. institutional investment real estate sector is likely to finally – and dramatically – embrace sustainable building principles. (A forthcoming companion paper by RREEF Research will examine global green building trends.) After providing a brief overview of the green movement in business generally and in real estate specifically, the paper documents trends in green building and focuses on the key drivers for green building investment – as well as the barriers that have limited this investment up to now. The paper also highlights potential green building investment opportunities, and practical and strategic considerations for major real estate portfolio owners.

The overall conclusion: Green building is fundamentally altering real estate market dynamics – the nature of product demanded by tenants, constructed by developers, required by governments and favored by capital providers. The upshot will be a redefinition of what constitutes Class A properties and even institutional-quality real estate. Unlike other recent technological innovations in building materials and systems, the greater tangibility of today’s sustainable design features are driving tenant expectations for greener buildings. The prospect

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of permanently higher energy costs will only accelerate the shifts, as will greater regulatory mandates and government incentives.

Finally, the move to greener buildings is being driven by two complementary “carrot and stick” forces: the “halo” effect cast from green projects, which rewards firms for undertaking popular environmental actions, while the growing corporate accountability movement compels greater disclosure of environmental impacts.

Accordingly, property owners will need to adapt quickly – or risk the consequences of sharply shrinking demand for property that, over time, becomes increasingly obsolete. To be sure, the universe of green buildings currently is still small enough that conventional buildings do not yet suffer competitive. Moreover, some product classes, such as downtown offices, are greening much more quickly than others, such as basic industrial. However, the green stock is growing so rapidly, largely through new construction, that the tipping point may be close at hand for some key markets – and certainly within the 10-year hold typical for assets just now being acquired.

Given a likely future competitive market that will strongly favor green buildings, and evidence that the cost of such upgrades are moderate, in many markets arguably all new product should be built green as a matter of course. In addition, investors’ existing building stock should be examined for its potential to upgrade to greener standards.

Those with fiduciary responsibilities, such as investors and investment managers that control large real estate portfolios, will be especially pressed to develop appropriate greening strategies for their business models. However, as with any major jolt in the economic landscape, a multitude of opportunities is also being opened for the enlightened firms that recognize and can adapt to the new realities.

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Executive Summary

The Changing Business Climate

The dialogue on climate change has changed markedly during the past year. Responding to public pressures, government mandates and new business opportunities, leading firms across a wide range of industries virtually compete to be the most “green.” This “greening” of business is part of a movement toward greater corporate accountability, forcing major companies to disclose their social and economic impacts. A related trend is the increasing demand for socially-conscious investment vehicles, which has grown ten-fold in the past decade to almost \$1.6 trillion.

Firms in many industries are recognizing the potential for outsized financial returns arising from entering new business lines afforded by the environmental movement. Other key motivations include fear of government regulation and the belief that sustainability initiatives can provide important competitive advantages through market differentiation.

Finding the Green in Real Estate

As one of the principal users of natural resources, the real estate sector stands as a central target of global efforts to reduce the “carbon footprint” of economic activities. Buildings account for 39% of the nation’s primary energy use, 70% of its electricity consumption, 30% of raw materials use and 30% of greenhouse gas emissions. Moreover, greenhouse gases attributable to buildings have been growing steadily over time, both absolutely and relative to other sectors. Beyond the direct ecological impacts of buildings, environmentalists focus on real estate because significant resource reductions can be achieved at relatively affordable costs as compared with other industries.

The real estate industry has always had its core of practitioners who recognize the special responsibility the sector has for the built and natural environments. But it has been only in the last few years that these voices have gained wider authority within the real estate community. Now organizations across the real estate spectrum are recognizing the importance of addressing environmental challenges

In general, government agencies and large corporations have been quicker to recognize and adopt the benefits of green buildings. Among the reasons: these large space users more frequently are owner-users of their facilities, and thus better able to capture the benefits of green buildings. On the other hand, pure real estate investors – investors who do not occupy the premises they develop or own – have been slower to the movement. Limiting participation by traditional real estate players has been the need for a compelling market-based business case for green buildings, compounded by the lack of industry standards.

Green Building Trends

The major program for certifying energy efficiency in buildings is the U.S. Department of Energy’s “Energy Star” program, which rewards the top 25% most energy-efficient buildings in the nation. However, since its ratings are limited to only energy efficiency, it cannot be considered a comprehensive green rating program.

There is no official green-building rating system, but the U.S. real estate industry seems to be coalescing around the USGBC (U.S. Green Building Council) and its LEED® (Leadership in Energy and Environmental Design) Green Building Rating Systems. Many cities now specify LEED standards in their building codes, and for a growing number of practitioners, being green means being LEED-certified. While energy efficiency is the single greatest distinguishing feature of green buildings, other important features include responsible land usage, conservation of natural resources and focus on indoor conditions.

Since the first LEED program was introduced in 2000, the USGBC has adopted programs covering different types of green buildings and activity, including new construction (two programs), renovation, interiors and others. As of mid-2007, close to 100 million square feet in over 800 LEED-certified buildings had been constructed. The greatest shares are office buildings and mixed-used projects, followed by institutional projects (civic buildings, transit projects, etc.) and educational facilities. Among the key trends:

- **Exponential growth** – The number of projects has been growing at a compound annual growth rate of 50% to 100%; in all, almost 300 projects were certified in 2006, nearly 20 times the number certified in first two years of the program combined.
- **Changing composition** in developers and tenants – Early on LEED projects were largely the province of government and corporate owner/users, but the pendulum has started to swing more to developers and smaller lessee tenants, with more speculative buildings and a decreasing share of net leased, built-to-suit, and owner-occupied buildings.
- **Regional concentrations** – Although LEED-certified buildings now can be found in every state and almost 400 cities across the country, green building activity is still highly concentrated in larger, politically-liberal states.
- **Higher certifications levels** – Projects certified at the lowest level have decreased steadily as a share of all LEED projects, while projects at the higher levels have risen.

While impressive, it still must be stressed that this growth started from a very small base, and green building cumulatively represents only a miniscule share of the country's property inventory – certainly well under 1%, and only 2% of non-residential construction last year.

Factors Driving Green Building Investment

A variety of market and societal forces are encouraging the development, use, and ownership of green buildings including tenant demand; government mandates and incentives; investor demand; industry support and pressures; and the changing green building cost structure.

Tenant demand – The burgeoning demand for green buildings by tenants is motivated several factors. First, companies are responding to **demands for environmental action** from their customers, workers, and even business partners; moving to green facilities is an obvious element of those efforts. Many firms also believe significant **goodwill benefits** derive from adopting green business operations. Corporate facilities, and especially headquarters buildings, can represent the public face of its environmental policies and efforts.

Green buildings also provide strong financial incentives to both owner-occupants and (net) lessees to adopt energy-saving technologies in order to **reduce utility bills** in the face of rising energy costs. Studies document energy savings for green buildings average 30% over conventional buildings, which equates to annual savings of \$135,000 for a typical 200,000 square foot office building.

Plus, some of the same green design features that make buildings less expensive to operate also render the facilities more conducive to contented, productive and healthy workers. With labor costs such a high proportion of a firm's overall operating costs, even small **productivity gains** can yield attractive financial returns, especially relative to facility costs.

Finally, anecdotal evidence suggests that some demand for green buildings is driven by normal tenant desires to have the newest, most prestigious space, as virtually all green buildings are new and most are built to superior construction standards.

The net result: given the opportunity, tenants will increasingly migrate from conventional "brown" to greener buildings, with the flight especially prevalent among large anchor tenants that demand premium space.

Government's role – Public sector policies are accelerating the move to green building through at least four key avenues: tenancy, leadership, regulation and incentives.

As a **tenant**, the public sector drives green building through the standards it sets for its own occupancy. The federal government has been especially impactful, early on setting high bars for its facilities and commissioning pioneering green architecture throughout the country. Federal policy now essentially requires all new facilities to meet LEED standards, and this policy may soon extend to their leased facilities as well. These policies are having a huge impact on national construction trends, as the U.S. Government is by far the country's largest real estate owner and tenant.

Government also wields more subtle power to influence markets by **raising awareness** and demonstrating the efficacy of green buildings. In many markets, the public sector has constructed the first local green building, which thus provides tenants and developers their initial close-up exposure to green buildings.

However, the public sector's greatest influence over green building is through its **regulatory powers**, directly, by mandating how and where buildings are constructed, and indirectly, by affecting the costs or benefits of development or ownership. The main factor here is local government, which has primary responsibility for land use regulation in the U.S. What began with subsidies for greater energy efficiency (often offered by the local utility) now includes expedited permitting for LEED buildings and even outright requirements that all new (generally larger) buildings meet LEED standards.

On the horizon is a serious push by engineers for the first major update to the energy efficiency-standards in building codes since the 1970s. When incorporated into local building codes, "Standard 189P" will raise energy-efficiency requirements by 30%. Finally, federal action is also possible through its efforts to limit greenhouse gases, via either a "carbon tax" or a "cap-and-trade" system, both of which could make energy-inefficient buildings even more expensive to operate.

The net result of these new and emerging regulations: brown buildings will be increasingly difficult to construct, and ever more costly to operate.

Investor demand – Though slower to manifest than the tenant-driven demand from owner-users in the public and corporate sectors, investors are now recognizing the opportunity to profit from green building investments.

Pushing investors into this arena have been the same societal forces propelling **socially-conscious investing** – the desire among an increasing share of investors to feel good about the uses to which their capital are devoted. The Responsible Property Investing (RPI) movement advocates "triple bottom line" accounting that tracks environmental and social impacts, as well as the traditional financial returns. RPI is becoming especially common with public pension funds, which account for a large share of real estate ownership in the country.

Capital flows from foreign countries, where green investing is more common, is another force for change as international investors bring both elevated expectations and product knowledge to their U.S. real estate investments. Both of these factors can drive down cap rates, though the evidence to date is slim.

And *pulling* investors demand into the green arena are the increasingly attractive **investment options** presented by green buildings. Despite an ongoing debate as to whether green buildings should be viewed as a distinct investment product, the rising prevalence of green real estate funds suggests that a specialized market does indeed exist – close to \$2 billion in announced plans already.

Industry support – Professional organizations are raising awareness of the opportunities and serve as clearinghouses of information for how interested parties can successfully incorporate green sensibilities into their own projects and investments – as well as providing moral and competitive suasion.

The business case – Finally, and for most investors, most importantly, is the business case for green buildings based on their operating and financial performance. Despite the diminutive universe of investor-owned green buildings, the available evidence suggests a compelling investment case.

For **new construction**, the emerging consensus is that with careful planning, the cost premium for green construction can be minimal to non-existent, and well within the normal range of early-stage cost contingencies; from there, cost reductions through value-engineering often bring down projected premiums when the building is actually constructed. Green buildings are also eligible for a variety of incentives that can more than offset any putative cost premiums.

The costs and net benefits of **renovating existing buildings** to green standards is less certain because the extreme diversity of the standing stock (*e.g.*, age, condition, quality) makes blanket statements impossible. The record is clear with respect to energy-efficiency initiatives, however, as many studies have documented the feasibility of undertaking appropriate energy-efficiency retrofits.

With regard to **operating performance**, the evidential record is wanting. However, RREEF Research has used mined data in the CoStar database that support anecdotal claims that green buildings lease up quicker, at higher rents, and maintain higher occupancy levels than conventional buildings.

The record with respect to **financial performance** – whether green buildings trade at lower capitalization rates or yield higher returns on investment – is even more limited, as so few investor-owned green buildings have sold, but logically, green buildings should trade at elevated values relative to conventional buildings: they tend to cost not much more to build than conventional buildings but can yield substantial operating cost savings and other tangible benefits for tenants, which translate into superior operating performance; add in the subsidies available to greener buildings, and a favorable return profile relative to conventional buildings seems probable, if not definitive.

Factors Limiting Green Building Investment

Several forces have been restraining green building, particularly by third-party investors:

Awareness and experience – Despite the proliferation of green buildings to all corners of the country, green buildings still tend to be highly concentrated in certain cities and regions, thereby limiting **awareness** by tenants and developers alike. Similarly, with limited local examples, few professionals have had the requisite specialized **knowledge** and **experience** to design and operate green buildings successfully. The small number of LEED certification specialists has been another industry-wide bottleneck.

Data sources and metrics – Institutional interest in green buildings has been constrained by the **lack of** a comprehensive and transparent set of operating and transaction **data and reference material** that are standard for traditional real estate products. The appraisal profession also has yet to conclusively determine how green features translate into asset value, as lenders have yet to agree on how green figures into underwriting criteria.

Misalignment between owner costs and tenant benefits – Many of the benefits of green buildings, at least for now, seem to accrue to the user (as opposed to the non-occupying owner) of the property; nor is it clear that tenants *fully* compensate landlords for the value of

these benefits. Thus, prudent developers and investors might be wary of adding green features with **unproven market acceptance**. Another reason is that **life-cycle costing**, a central premise of the green-building business case, typically assumes a much longer amortization period – 20 to 30 years – than the typical investor's holding period.

Prospects for Green Building Investment

All available indications suggest that green investment is poised for tremendous near-term growth. The number and building area of LEED projects have increased strongly every year since 2001 – despite cyclical trends in overall commercial construction. Looking forward, one clear indicator of prospective activity is the number of projects applying (“registered”) for LEED certification. Over 8,000 commercial projects are now in the LEED pipeline, more than double the number last year and seven times the number cumulatively certified to date.

Another harbinger is the growing popularity of green building as new LEED programs are introduced covering more types of product. During the past three years, new LEED construction has been growing at a compound average rate of about 50% per annum. This growth rate cannot be sustained indefinitely, but were growth to continue at the same rate for only the next five years, the amount of new green construction would rise from 21 million square feet last year to almost 200 million square feet in 2011 – 10 times the current volume but still realistic at less than an eighth of 1.5 billion square feet of non-residential space constructed annually in the U.S.

Market Opportunities

Institutional investors will find outstanding opportunities to participate in the greening of U.S. real estate – as well as challenges. The easiest avenue will be for **new construction**. With development costs of green buildings now within the range of normal contingency factors, in many markets it will be hard to justify *not* building green. In fact, many developers will find that their newer buildings with modern HVAC systems already satisfy the bulk of LEED requirements; their only issues (and expenses) are those associated with applying for certification, and deciding whether to aim for higher levels of green.

Early adopters of green building can anticipate reaping above-market returns in the near- and even intermediate-term, as construction fails to keep pace with the exploding demand. These premiums should erode somewhat over time as green building expands and the scarcity of green product declines, though rent premiums for net leases should endure relative to less energy-efficient buildings.

Despite excellent prospects for new construction, the amount of space involved, even under optimistic assumptions, is insignificant relative to the stock of standing buildings. Thus, major portfolio owners are faced with the challenge of what to do with their **existing inventory**, dominated by brown buildings. Rising energy prices have long been motivated managers to explore all feasible options for enhancing energy efficiency, but the recent price surge – and expectations for continued elevated energy prices – provide owners with new opportunities to revisit their investment assumptions and develop realistic expectations with respect to payback periods and return parameters for energy retrofits. When capitalized expense savings compare favorably with renovation costs, the decision to retrofit is a relative easy one.

Going the next step to LEED status is a more complex decision if based solely on long-term investment value, however, as market premiums for renovated green buildings is less clear. Moreover, many of the credits required for certification are more easily attained when the building is vacated – a costly move for investor-owned buildings. But as tenant demand for green buildings outpaces the market's ability to supply new product, many existing buildings will be able to successfully tap into the green market through retrofits or renovation.

Especially attractive will be Class B structures with good “bones” located in superior locations that can be repositioned to Class A status after renovation.

Portfolio owners also will need to consider when to part with older, energy-inefficient properties whose renovation is infeasible. At present, there is not enough green product available to force discounts for brown buildings, but that dynamic will flip once there is a critical mass of green buildings.

The challenge for acquiring new assets is even more difficult. With the scarcity of green product available for purchase, no investor of any size can adopt a green-only program focused on acquisitions. Rather, investors seeking a green strategy, aside from upgrading their own portfolio and building new product, will need to acquire existing brown product with an eye toward retrofitting to greener standards. This strategy can complicate the due diligence process going forward by requiring much greater understanding of a building’s operations than is typical for acquisitions today.

In general, green market potential is greatest for higher-value investment properties where tenants are willing and able to pay for prestige and benefit most from energy-expense reductions. Clearly downtown offices are leaders, followed by upper-end suburban office complexes. Apartments and hotels also present strong greening opportunities, driven by tenant demands, again particularly for more upscale properties. Tenant demand is also stoking the drive to greener retail spaces and shopping centers, a movement that will accelerate with the pending LEED retail categories; however, outdoor centers, especially modest neighborhood centers, likely will see less green activity, as energy costs tend to be relatively low. Similarly, industrial buildings – warehouses, distribution facilities and lower-end office/industrial product – probably will see limited near-term investment potential for greening.

However, development and renovation opportunities will not be limited to high-end product. With rapidly growing environmental awareness and concerns, developers can expect to field growing demand for green product at a variety of price points.

Beyond the asset-specific opportunities to develop, acquire, or renovate green product, developers and investors can also capitalize on the same goodwill benefits driving corporate owner-users and major tenant groups. However, to date, the institutional investment community has lagged the rest of the industry in trumpeting its successes.

With regard to financing opportunities, most green building development has been funded either internally by owner-users or through conventional investment funds. Going forward, however, green funds and green REITs are likely to play ever-larger roles in financing and acquiring green buildings, providing greater capital funding for this product and an attractive investment vehicle for socially-conscious investors, as well as new business opportunities for investment managers.

Risks and Strategic Considerations

Any move into a new product or market brings its share of risks along with the rewards. The main risks associated with moving into the green building arena are the inevitable missteps that less experienced players will make in attempting to enter this market: underestimated construction costs, product that misses the mark and inability to deliver on promises. The challenge will be to gain experience with the product and market, and being able to forge the relationships with providers to deliver and manage the product.

In the case of green building, however, the risks of not moving quickly enough almost certainly will outweigh the risks of moving too quickly. The key risk to inaction is product obsolescence. At present, a shortfall of product relative to potential demand for green product is likely yielding financial premiums for the limited supply that is available. But that equation

will flip once the supply reaches a critical mass and establishes a new norm for institutional-quality real estate.

But when? Clearly, some markets will get there sooner than others, but even in the greenest market areas, the tipping point undoubtedly is still at least several years off. This conclusion should not invite complacency, however. The pace of green building is escalating so rapidly, particularly in major money-center markets, that green buildings will approach a critical mass within just a few years – certainly within the 10-year holding period typical for assets just now being acquired.

A related risk is that less energy-efficient buildings will face increasing leasing challenges due to elevated energy prices. Tenants increasingly consider the total cost of occupancy, including utility charges, and landlords with less inefficient buildings will have to absorb some of those expenses, by either capping utility charges or setting rents proportionately lower. In either case, operating income suffers.

A final risk is that the wealth of incentives that governments and utilities now offer for going green will be increasingly replaced by mandates and penalties for those that do not. The likelihood of a federal carbon tax or cap-and-trade program, and the near certainty of stricter energy standards in building codes, will only compound the problem for owners of less efficient buildings.

Investors and investment managers with fiduciary responsibilities will be especially pressed to develop sensible policies that leverage green opportunities while avoiding unnecessary risks associated with continuing to hold less-green properties. The difficulties are magnified for investors that control large real estate portfolios, particularly until the supply of green product expands to a more equilibrium level.

The Greening of U.S. Investment Real Estate – Market Fundamentals, Prospects and Opportunities

Business Discovers the Green in Green

The dialogue on climate change has changed markedly in tone and intensity during the past year, elevating from an arcane issue debated among scientists and policy wonks to an everyday subject of news articles, political discourse and popular culture. Every aspect of society seems to be involved, with religious and business leaders joining government officials, academics and pop stars calling for environmental action. With every major storm and heat wave (only half jokingly) attributed to global warming, the very term has suddenly joined the popular lexicon.

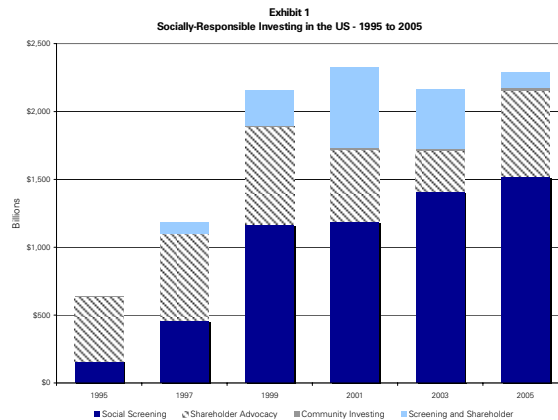
The revolution has been no less dramatic in the business arena, where leading firms across a wide range of industries virtually compete to be the most green. Even energy and manufacturing trade associations are supporting greater regulatory action on global warming. The change has been breathtaking. Five years ago, only the rare Fortune 500 company addressed environmental concerns as more than a peripheral issue. Today, few do *not* have a comprehensive set of green policies. Many have gone even further, fully integrating environmental standards into everyday business practices. Among the most prominent examples is investment bank Goldman Sachs which has adopted a diverse set of environmental initiatives, from investing in renewable energy and energy-efficiency projects to providing liquidity in emerging energy markets, and constructing a green headquarters building.

This “greening” of business can be seen as part of a movement toward greater corporate accountability, as major companies are now expected to promulgate “corporate sustainability reports” disclosing their impacts in various social and economic areas beyond their core businesses. Virtually half (49) of the Standard & Poor’s 100 companies are now divulging information about their environmental, social and governance performance. More than a third of the companies (38) use the strict “Global Reporting Initiative” guidelines for reporting social responsibility activities.¹

Altruism and civic-mindedness are hardly the only – or even most important – factors contributing to this conversion. Many firms are finding their clients, customers and even business partners are demanding greener business practices. Wal-Mart is pushing its suppliers to reduce the amount of packaging by 5% over the next five years, while Dell is encouraging its primary suppliers to report greenhouse gas emissions data, with threats to reduce orders from those who make insufficient progress.

A related trend is the increasing demand for socially-conscious investment vehicles. Investments in socially-screened funds have mushroomed tenfold within a decade, from an estimated \$162 billion in 1995 to almost \$1.6 trillion ten years later (Exhibit 1). Adding in funds that practice shareholder advocacy for social and environmental issues brings the total to \$2.3 trillion, or almost 10% of total financial assets under professional management.²

And firms in many industries are recognizing the potential for outsized financial returns from taking leadership positions in adopting emerging cleaner technologies or entering new business lines afforded by the environmental movement. Sales of Toyota’s Prius hybrid car through September are up 70% this year over last, and its hybrid Camry model is up more than 90%, while other manufacturers struggle with sales of their own hybrid cars.



A recent paper from Deutsche Bank's Asset Management Division outlines a host of investment opportunities across many industries, afforded by the regulatory reactions of governments to climate change.³ The financial sector, and investment banks in particular, have been especially outspoken and progressive. In addition to the Goldman Sachs' initiatives, several other banks have made major commitments:

- Bank of America has pledged \$20 billion to encourage the growth of environmentally-sustainable business practices through lending, investing and philanthropy.
- Citibank has allocated \$50 billion to combat global climate change by supporting the growth of alternative energy and clean technology.
- This summer five global banks (ABM AMRO, Citibank, Deutsche Bank, JPMorgan Chase and UBS) signed on to the Clinton Foundation's Energy Efficiency Building Retrofit Program to provide funding to 15 of the world's largest cities to reduce energy consumption and carbon emissions; each bank has committed \$1 billion.

Beyond the financial sector, firms across many industries have been laying out their own green policies. These goals frequently relate directly to the firms' use of real estate, such as retrofitting corporate facilities to reduce energy costs, as well as scoring goodwill points by occupying greener facilities. In many cases, the incentive is central to the firms' mission or image, such as producing greener cars (Toyota) or cleaner energy (BP). In fact, research from McGraw-Hill Construction finds that virtually two thirds of large U.S. corporations believe that sustainability efforts provide important competitive advantages through market differentiation.⁴

Another motivation is fear of government regulation. Firms are collaborating to set proactively green standards for their industry, and thus preempt potentially more severe government regulation. This year has seen the American Petroleum Institute (API), the primary trade association in the United States representing the oil and natural gas industry, call for greater corporate action to reduce greenhouse gases.⁵ The Edison Electric Institute (EEI), America's main power utility trade association, went even further, calling for a combination of voluntary business as well as federal legislation to reduce greenhouse gas emissions.⁶

Finally, the environment is increasingly being viewed as a moral issue. At a Vatican conference on climate change, Pope Benedict urged scientists and politicians, as well as the church, to "focus on the needs of sustainable development."⁷ The Vatican has joined a rising chorus of warnings from churches around the world decrying abuse of the environment and declaring that the Catholic Church must become far greener. The Vatican has already taken its own first steps: converting to solar-powered energy for a papal audience hall and committing to

becoming the world's first "carbon neutral" sovereign state by planting trees in a Hungarian national park to offset the carbon-dioxide emissions and energy use of Vatican City.

In summary, many issues have gained traction almost simultaneously in recent months, to the point where the business world has raced ahead of the general public and even government regulations in raising and addressing environmental issues. As a result, 2007 likely will be seen as a watershed year in which green issues were widely adopted in the corporate sector. It is no exaggeration to say that with this combination of new business opportunities and market risks, in concert with growing government incentives and mandates for action, no industry and no firm can afford to stand still.

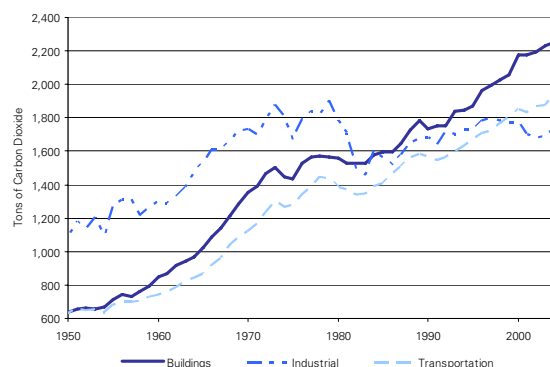
The Focus on Real Estate

As one of the principal users of natural resources, the real estate sector stands as a central target of global efforts to reduce the "carbon footprint" of economic activities. Virtually every aspect of property development and operation has significant ecological consequences: from the location of the parcels on which buildings are sited, to the materials required to construct improvements, to the energy required to operate them. Buildings in the U.S. account for:

- 39% of U.S. primary energy use
- 70% of U.S. consumption of electricity
- 12% of all potable water and 30% of raw materials use
- 30% of greenhouse gas emissions⁸

The share of energy use in major cities – where development is more dense and automobile use is relatively less – can be twice the national average. Moreover, greenhouse gas emissions from buildings have been growing steadily over time, both absolutely and relative to other sectors. Energy-related carbon dioxide emissions have increased 250% since 1950, compared to 212% for those emitted by the transportation sector and only 54% for industry.⁹ Whereas 50 years ago buildings in the U.S. emitted about the same amount of carbon dioxide as the transportation sector and only 60% as much as industry, buildings now contribute 14% more than transportation and 34% more than industry (Exhibit 2). Clearly, the real estate sector as a whole has done less to control greenhouse gases than have other major sectors, making it a logical focus for environmental activism.

Exhibit 2
Carbon Dioxide Emissions in U.S. by Sector



Sources: U.S. Department of Energy and RREEF Research

Beyond the direct ecological impacts of buildings, environmentalists focus on real estate because significant resource reductions can be achieved at relatively affordable costs as compared with other industries. A widely-cited study by the European electricity utility

Vattenfall AB found that real estate is responsible for 21% of greenhouse gas emissions globally.¹⁰ Yet significant emission reductions are easier and less expensive to attain in real estate than in any other sector. Many of the measures for real estate involve little or even negative net costs compared to their long-term cost savings are considered. It is clear from this and similar studies, as well as the actions of governments around the world, that society will increasingly look to the real estate sector to ameliorate climate change.

Mainstreaming Green in Real Estate

The real estate industry has always had its core of practitioners who recognize the special responsibility the sector has for the built and natural environments. Many both inside and outside the industry have been calling for more responsible property development patterns that preserve green space and concentrate land uses, and these perspectives started to gain momentum within the past generation. The New Urbanism and “smart growth” movements, among others, have been advocating denser, mixed-used development in transit-oriented locations, while environmentalists seek more energy-efficient construction. The U.S. Green Building Council (USGBC), the main organization that sets standards for green buildings in America, was formed in 1993 and issued its first building standards, known as LEED (Leader in Energy and Environmental Design), in 2000.

But it has been only in the last few years that these voices have gained wider authority within the real estate community. Now the industry is sprinting to catch up with other sectors in tackling environmental issues. Just this summer two leading real estate trade organizations called for dramatically expanded action. In early July Todd Mansfield, the new chairman of the Urban Land Institute (ULI), one of the nation’s leading real estate development and land use organizations, identified sustainability as ULI’s top priority, urging:

“land use design and development practices that keep urban regions sustainable on an economic, social and environmental basis . . . It means determining more sustainable land use patterns, renovating existing structures and building in a way that reduces carbon dioxide emissions . . .”

Two weeks later the Building Owners and Managers Association (BOMA), the main industry group for the commercial office sector, unveiled its Market Transformation Energy Plan. Among other initiatives is a “7-Point Challenge” of steps that building owners and managers can take to reduce their use of natural resources, and waste production.

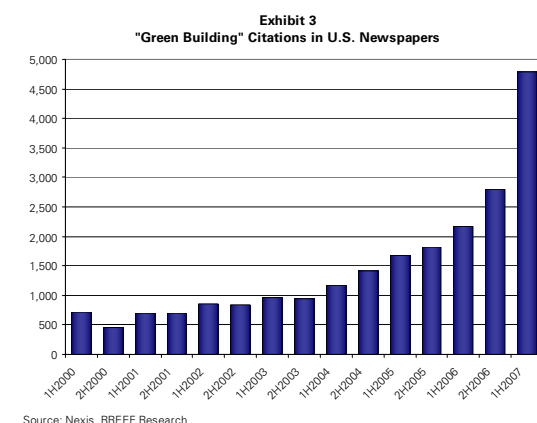
Other examples abound: Five years ago environmental considerations seldom merited mention, let alone focus, at real estate industry conferences. Today, it is the rare industry event that does not feature a green angle, and the number of green-focused seminars and panel discussions is almost too great to count. No longer the exclusive purview of planners and architects, the last year has seen green educational events sponsored by ULI, BOMA, the International Council of Shopping Centers (ICSC), The National Association of Industrial and Office Properties (NAIOP), among many other industry groups.

Nor is the growing popularity of green building confined to industry practitioners and academics. As with environmental issues generally, the public has taken a keen interest in green buildings, as reflected in the growing prevalence of press stories on the issue. A Nexis search revealed that the number of such stories in mainstream newspapers has grown almost tenfold from under 500 in the second half of 2000 to more than 4,500 during the first half of 2007, and the trend seems to be escalating (Exhibit 3). Clearly, people are paying attention.

For those long championing a greener real estate sensibility, this new-found industry interest may be viewed as welcome if belated. By contrast, government agencies and large

corporations in the United States have been much quicker to recognize and adopt the benefits of green buildings. Among the reasons: these large space users are more frequently owner-users of their facilities, and generally better able to capture the benefits of green buildings.

On the other hand, pure real estate investors – that is, investors who do not occupy the premises they develop or own – have been much slower to the movement.* To be sure, socially-conscious investing has reached the shores of the real estate industry. A growing number of players employ a “triple bottom line” business model that measures returns in terms of the social and environmental impacts of their activities, as well as traditional financial metrics. However, Responsible Property Investing (RPI), as it is known, still exists only on the industry periphery, and overall involvement in green buildings by investors has been minimal.



A variety of factors have been limiting participation by traditional real estate players, but perhaps most significant is a classic “Catch 22” paradox: investors are wary of committing resources until the financial performance of green product is proven, but this performance record cannot be established until sufficient investment-grade assets are developed and sold. Nonetheless, investors are starting to recognize the benefits of green properties and get more comfortable with the product. With this growing familiarity, as well as a variety of carrots and sticks, investor-owned green building activity can be expected to mushroom.

Some Definitions: Just What is a Green Building?

In order to discuss the greening of real estate, it is first necessary to establish just what constitutes a green building. This turns out to be less straightforward than might be supposed, as there is not broad agreement within the real estate community – to say nothing of the broader constituency that is concerned with the environment – as to how to define a green building. We also must distinguish between outlining the general characteristics of a green building from the standards and process required to earn a green designation.

One early definition was adopted in 1987 by the United Nations World Commission on Environment and Development (WCED), which defined “sustainable development”[†] as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”¹²

* Clearly, firms that own their facilities have “invested” in their real estate. However, as used in this paper, “real estate investors” means non-occupying or third-party owners, as opposed to entities that own and occupy their facilities.

[†] “Sustainable development” and “green building” are used interchangeably in this paper, though some analysts imbue “sustainable” with social as well as environmental qualities.

The obvious drawbacks to this definition are its generality and overreaching breadth. For this paper, we prefer a more specific and narrow approach advanced by the U.S. Office of the Federal Environmental Executive (OFEE), which defines “green building” as those that:

- 1) increas[e] the efficiency with which buildings and their sites use energy, water, and materials, and 2) reduc[e] building impacts on human health and the environment through better siting, design, construction, operation, maintenance, and waste removal through the complete building life cycle.¹³

Embodied in this definition are the ideas that efficient resource use, particularly of energy, is a fundamental priority, but also that green buildings must satisfy broader environmental considerations that take into account a building’s impact on its surroundings and those who use the building. Thus, green buildings are more than just energy-efficient structures, such as those certified by the Department of Energy’s “Energy Star” program. Indeed, this broader definition is explicit in the LEED name, which reflects both “Energy” and “Environmental” factors. Nonetheless, energy usage is the single greatest distinguishing feature of green buildings. In fact, buildings that meet California’s Title 24 energy standards can score more than half of the points required for the lowest LEED (“Certified”) level for new construction.

Also important is conservation of other natural resources, especially water but also including the materials used to construct the building (e.g., using less but stronger steel framing), as well as encouraging the use of locally-produced material as a means of reducing the energy required to transport the building materials to the project site. Green building standards also are designed to limit the production of on-site waste, including effluents and trash.

Another feature, explicit in the OFEE definition and widely embraced in the green-building community, is the focus on building locations, not just the building itself. From an ecological perspective, the most desirable project sites are those that involve reuse of previously-developed sites having ready access to public transportation, as opposed to greenfield sites in sprawling, largely undeveloped areas.

Finally, it is commonly agreed that sustainable buildings should be designed and operated based on their life-cycle costs, which reflects the cost of the building over its entire life span rather than on just the “first” costs. Implicit in this approach is the perspective that some green features cost more to construct than their less environmentally-friendly counterparts (though the common perception of these costs is often overstated), but that many of these cost premiums are offset by lower long-term maintenance and/or operating expenses.

Together these factors can dramatically lower utility usage and expenses, which is why green buildings are often referred to as “high-performance” buildings. Studies compiled by the USGBC find that compared with conventional buildings, the typical green building generates:

- energy savings of 30%
- carbon savings of 35%
- water use savings of 30% to 50%
- waste cost savings of 50% to 90%

Similarly, green buildings are often valued for their “business performance,” that is, the *internal* impacts on the building users, as opposed to just the *external* impacts on the environment. Although firms perhaps rarely select green buildings for their business performance, tenants are often pleasantly surprised by the positive impacts of green buildings on employee morale, productivity, absenteeism, and turnover. These attributes are discussed more fully in the following section on green building benefits.

The Different Shades of Green

With the movement to encourage greener building construction and operation came the need for specific standards to give developers and building managers tangible goals for their projects – and set standards for those claiming the green imprimatur. Reflecting the disparate views on what constitutes a green building, a wide variety of approaches and criteria have been advanced for assessing and certifying the greenness of buildings.

First out of the gate was the EPA's Energy Star program, which began certifying buildings in 1999. The program rewards the top 25% most energy-efficient buildings in the nation based on studies of industry averages, but since its ratings are limited to only energy efficiency, it cannot be considered a comprehensive green rating program.

Worldwide more than 15 bodies certify green buildings, each of which applies a distinct take on sustainability. Certainly, the LEED Green Building Rating Systems promulgated by the USGBC are the best known and most widely accepted in the United States, but their acceptance is not universal. Other standards dominate in other countries, e.g., ABCR (Australian Building Greenhouse Rating) in Australia, CASBEE (Comprehensive Assessment System for Building Environmental Efficiency) in Japan, and BREEAM (Building Research Establishment Environmental Assessment Method) in the United Kingdom.¹⁴ In fact, BREEAM claims to be the world's most widely used environmental assessment method for buildings.¹⁵

Even in the U.S., LEED is hardly the definitive word. Many practitioners find great fault with the LEED standards. Predictably, some find the standards too onerous, some too easy and some just off point. The application process itself is widely viewed as being too burdensome and expensive, though recent modifications have aimed to defuse this issue. Moreover, many other standards have been advanced, some of which are gaining broader acceptance, such as Green Globes and GBTool, as well as regional programs focused on homebuilding, such as Earth Advantage (Oregon), EarthCraft (Atlanta) and Build It Green's GreenPoint (California).

Nonetheless, the U.S. real estate industry seems to be coalescing around LEED. Some cities now specify LEED standards in their building codes, and CoStar, the leading source for asset-level real estate data, uses LEED certification as the benchmark for designating buildings as green in its database.[†] Thus, for a growing number of practitioners, being green means being LEED-certified. And the LEED approach is spreading globally under the auspices of the World Green Building Council (WorldGBC). To date nine countries have established Green Building Councils (GBCs),¹⁶ and at least 16 more in the process of being formed. All told, the WorldGBC claims to represent over half of global construction.

Accordingly, while LEED is far from an official designation – and debates rage on as to the best green certification systems – this paper relies primarily on LEED activity as a reference point for assessing various industry trends.

The LEED System in Brief

The LEED programs were created by the USGBC, a consortium of public and private entities devoted to encouraging and facilitating greener buildings. The initial LEED standards were intended to cover a broad spectrum of building types, while later standards have been developed for more specialized building types and situations. Currently nine LEED programs have been adopted or released for testing. The largest cover construction of new owner-user buildings (New Construction or LEED-NC adopted in 2000) and renovations (Existing Buildings or LEED-EB, 2004), and new speculative development (Core and Shell or LEED-CS, 2006).

[†] CoStar also reports on buildings having an Energy Star rating.

One program focuses on tenant spaces (Commercial Interiors or LEED-CI, 2004), another on schools (2007), and several others are in pilot stages including two programs for retail (one for interiors, one for structures), one for homes, and one for planned communities.

LEED certifications are awarded through an application process in which buildings score points for incorporating specific green design features or achieving various benchmarks. The credits are grouped along categories appropriate to each program. For example, the New Construction program has six categories including Sustainable Sites, Energy and Atmosphere, and Indoor Environmental Quality; not surprisingly, the energy category has the greatest number of possible points. Depending on the final score, a LEED project is certified at one of four possible levels: Certified (lowest), Silver, Gold, or Platinum (highest). Additional information on the USGBC and its LEED programs may be found in Appendix A.

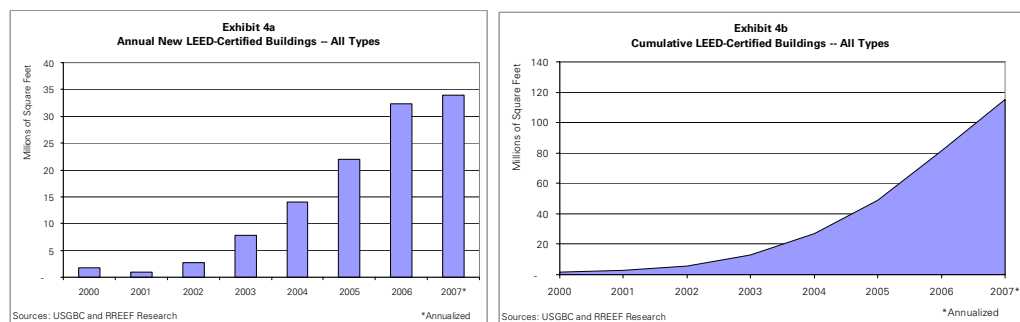
Green Building Trends[§]

As of mid-2007, close to 100 million square feet in over 800 LEED-certified buildings had been constructed. The greatest shares are office buildings and mixed-used projects, followed by institutional projects (civic buildings, transit projects, etc.) and educational facilities.

The vast majority of LEED projects have been certified under the LEED-NC program, with more than three fourths of all projects to date. Next most popular has been the LEED-EB program for renovations, which has accounted for 16% of building area to date. But recently the new LEED-CS program aimed at speculative development has jumped to second place with 14%. The LEED-CI program, with smaller average project sizes, accounted for 13% of projects completed to date but only 5% of the building area. Together these trends reflect increasing influence of investor-owned green buildings and suggest the increasing pressures on property owners and developers will face to go green.

Green Building Activity

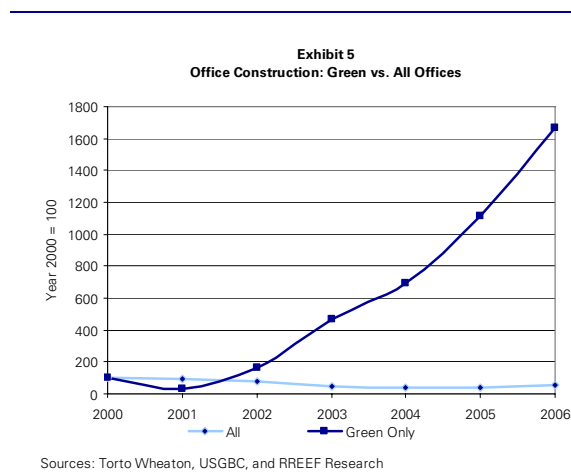
The most conspicuous trend is the growth in green building since LEED-NC was adopted in 2000. In fact, subsequent to a modest decline in 2001 – after the initial rush during the kick-off year – the number of projects has been growing at a compound annual growth rate of 50% to 100%. And this despite the general economic downturn from 2001 to 2003. In all, almost 300 projects were certified in 2006, nearly 20 times that certified in 2000 and 2001 combined, while the 32.4 million square feet of space in LEED buildings certified last year was more than 12 times that in 2000 and 2001 combined (Exhibits 4a and 4b).



[§] Figures in this section are based primarily on a USGBC database of LEED projects, with activity current through May 2007. RREEF Research extensively scrubbed and reclassified the data for this paper. Accordingly, our analysis of LEED activity differs substantially from other published accounts that apparently did not undertake this database refinement.

Another perspective on the growth: Half of all LEED building area was certified in the last 17 months alone, equal to the amount certified in the first six years of the program. In sum, the building area of LEED buildings amounted to over 96 million square feet as of May, with some 810 buildings certified.**

This growth is all the more remarkable because it occurred during a period of relatively moderate commercial construction. For example, after peaking at over 100 million square feet of space in 1999, office construction in the U.S. declined to 89 million square feet in 2000, the first year of LEED certifications. Thereafter, additions declined each year through 2004, and then grew in 2005 and 2006, but reached only half of its 2000 level. In contrast, green office building grew progressively more each year after 2001, and last year was 15 times its level in 2000 (Exhibit 5).¹⁷ Other product types show comparable patterns. Green buildings still constitute only a very small share of total U.S. construction, but the forces propelling green building construction are clearly distinct from those driving U.S. property markets generally.



Still, this growth, no matter how significant, nonetheless started from a very small base, and green building cumulatively represents only a miniscule share of the country's property inventory – certainly well under 1% and only 2% of annual non-residential construction.

Other Building Trends

In addition to the sheer volume of green building, close analysis of this activity reveals several other key trends, including a changing composition in developers and tenants and regional concentrations. More detailed data and analysis may be found in Appendix B.

Changing composition in developers and tenants – Early on LEED projects were largely the province of government and corporate owner/users, but the pendulum has started to swing more to developers and smaller lessee tenants, with more speculative buildings and a decreasing share of net leased, built-to-suit and owner-occupied buildings.

The grading system for LEED-NC is oriented to owner/users, as speculative developers generally cannot earn the points for tenant spaces needed for certification. On the other hand, the newer programs for LEED-CI and especially LEED-CS are much more accommodating of private, non-occupying building owners and speculative developers. Thus, developers account

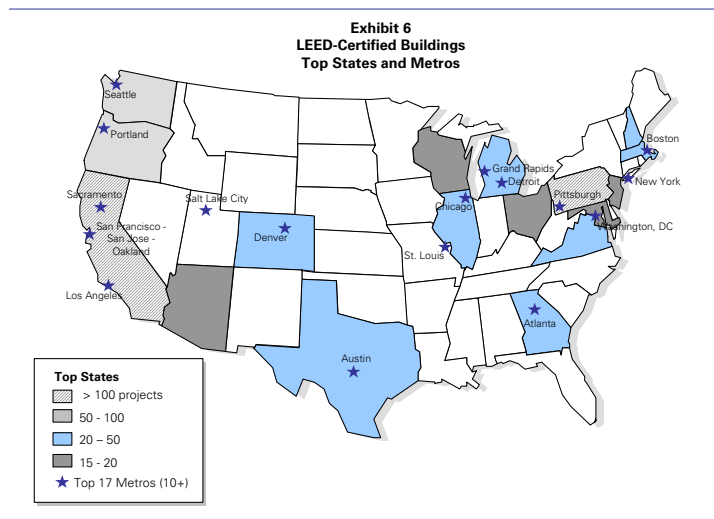
** For comparison, 3,200 buildings had received the Energy Star label through the end of 2006, with 575 million square feet of space. Note, however, that the vast majority of Energy Star space represents designations for existing buildings, whereas the LEED data is primarily designations for newly built or renovated structures.

for almost 90% of the space certified under the new Core and Shell program, but only 10% of the original New Construction program.

The changing ownership patterns are bringing change to the types of tenants in green buildings as well, with smaller tenants in multi-tenant buildings rising dramatically while the government share is plummeting, and corporate single-tenants also declining.

Regional concentrations – Although LEED-certified buildings now can be found in every state and almost 400 cities across the country, green building activity is still highly concentrated in larger, politically-liberal states. The top 10 states have fully two thirds (67%) of the LEED building area, despite having barely 40% of the nation's population. Extending the list to the top 15 states brings the LEED share to about 80% of the LEED building area, compared to less than 60% of the nation's population.

Drilling down to the regional level, LEED buildings tend to be highly concentrated in larger metros, such as New York, Atlanta and Los Angeles, but capital cities (or other areas with significant government operations) also rank highly, reflecting the predominance of government facilities among LEED buildings (Exhibit 6).



Higher certifications levels – Projects certified at the lowest level have decreased steadily as a share of all LEED projects, while projects at the higher levels have risen. Projects certified at higher than the minimum level (silver, gold or platinum) now account for two-thirds all LEED buildings, up from 55% in the early years. A key reason: developers are gaining of greater experience with green product and a better understanding of how to score LEED points. Further encouraging the push to higher LEED levels are the various local government incentive programs that only kick in at the gold level, as discussed below.

Factors Driving Green Building Investment

What accounts for this astonishing growth in green building activity? How likely is this growth to continue, at what rate, and in what form? And finally, what are the implications for owners and investors in real estate? Answering these questions requires an understanding of the factors driving the greening of real estate – as well as the factors that have and continue to limit its adoption.

For most tenants and investors considering green buildings, their analysis will begin, and perhaps end, with the business case – what are the reasonably foreseeable financial benefits to green buildings relative to their cost? But increasingly, firms will also factor in other non-

financial issues – regulatory mandates, pressures from business partners and public relations among others – when making their locational and investment decisions.

Beyond the inherent physical and operational benefits of green buildings, several major forces are encouraging the development, usage, and ownership of green buildings including demand from tenants and investors; government mandates and incentives; industry support and pressures; and the changing green building cost structure.

Tenant Demand

The burgeoning demand for green buildings by tenants spans all product types: households are demanding greener homes and apartments; retailers want more energy-efficient stores; manufacturers are seeking cleaner facilities; and government agencies are requiring greener buildings. The motivations are as diverse as the tenant base, but four issues seem paramount: civic responsibility, the “halo” effect, property economics and business productivity.

a) Do the Right Thing

The first motivation ties to the rising global awareness of climate change and increasing pressures from and on occupants of all types of property to do their part to help. In the case of individuals and households, personal values directly influence their buying and leasing decisions, stoked by entreaties from pop stars and ever-greater media coverage of environmental issues. For many, the option to go green started with hybrid cars and now extends to their housing as well as other purchasing decisions.

In the business arena, tenants are responding to demands for environmental action from their customers, workers, and even business partners, not to mention their own corporate ethical principles. With major corporations and nonprofits increasingly expected to issue sustainability reports documenting their efforts on social issues, environmental actions are visible and comparatively easy to demonstrate tangible progress.

Firms are also finding that their environmental record is important in attracting and retaining staff, especially younger workers. And major companies like Dell and Wal-Mart are directly challenging their suppliers to reduce their environmental impacts, at the risk of losing business. All of these factors are encouraging companies to be proactive in considering environmental issues in all aspects of their business and operations. Moving to green facilities is an obvious element of those efforts.

The keen interest for green facilities is documented in numerous surveys of business leaders. Particularly telling is a recent survey of the membership of CoreNet Global, the leading trade association for corporate real estate professionals, whose members manage more than 700 million square feet of commercial property globally – in other words, the decision-makers responsible for leasing and contracting a significant share of space for corporate America. Almost 90% of the respondents consider sustainability to be a “near-term critical business issue,” and nearly 80% of respondents are willing to pay more for sustainable real estate. Significantly, the survey also found a “widespread perception that there’s a dearth of green space available, and a general perception in the real estate community that the industry is not doing enough to advance sustainability.”¹⁸

b) The Halo Effect

Beyond the specific demands placed on firms by their business partners and workers, investors and shareholders, many executives believe significant goodwill benefits derive from adopting greener operations. Corporate facilities, and especially headquarters buildings, are an

important reflection of a company's image and can represent the public face of its environmental policies and efforts. Among the most prominent examples: Goldman Sachs, Bank of America and JPMorgan Chase all have either completed or announced major office towers in Manhattan at either LEED Gold or Platinum levels. Each stands as a symbol of major environmental investment initiatives they are undertaking and provides the companies with an opportunity to improve their corporate image and differentiate their products.

Little wonder: Americans now expect the companies they patronize to be green. The 2007 Cone Consumer Environmental Survey found that more than 90% of Americans report having more positive views of environmentally-responsible firms. Even more important, "almost as many (85%) indicated they would consider switching to another company's products or services because of a company's negative corporate responsibility practices."¹⁹

Of course, it is debatable just how likely consumers are to actually follow through on these threats. But even small consumer shifts can be enough to influence corporate behavior. As noted previously, a McGraw-Hill survey found that virtually two thirds of large U.S. corporations believe that sustainability efforts provide important competitive advantages through market differentiation. A separate study found that 58% of Fortune 100 companies have a corporate sustainability strategy and that the two top objectives for the strategy are to improve the brand and to differentiate products.²⁰ Thus, it is not surprising that numerous corporations have leveraged their facility decisions to enhance their environmental credentials.

c) Energy Costs

No matter how compelling the social case and perceived marketing benefits of green tenancy, few firms would champion green buildings were there not a strong financial reward, whether as an owner-occupant or as a lessee. In a recent survey of North American business leaders conducted by Johnson Controls, over half of respondents said costs savings are either entirely or somewhat the driver for investing in energy-efficiency measures, compared to only 13% who cited environmental concerns as the greater motivator; the remaining 35% said cost savings and environmental responsibility are equally important factors.²¹

The central issue is rising energy costs. When LEED began in 2000, the price of oil had just tripled from \$11 a barrel in early 1999 to \$35 only 18 months later. While oil prices have certainly fluctuated since then, depending on global political and economic events, the price today exceeds \$90 a barrel and most analysts expect prices to remain elevated indefinitely.

As a result, building utility costs have jumped – though not nearly as much as oil costs. Last year annual utility costs for private office buildings in the U.S. averaged \$2.26 per square foot, up only 27% since 1999. A key reason: building and facility managers already have adopted many energy-saving technologies.^{††} Nonetheless, utility charges still represent a significant share of building operations, accounting for almost a third of variable operating expenses, and thus a visible target for enhancing returns.

For apartments, industrial buildings and retail space, lessees typically are responsible for their own utilities, either directly or via pass-throughs. For office buildings leased on a gross basis, the responsibility often falls on the landlord, but this distinction is moot when the tenant owns the building, as is the case for a significant share of space occupied by large corporations. For leased offices, responsibility for utility costs varies by market and class of product, but in most areas, tenants absorb at least the increases in expenses over a base year, if not all of the

[†] In addition, some components of utility costs, such as administration and distribution, are rising more slowly than are energy costs.

utility expenses. In all of these cases, occupants are highly motivated to seek out energy-saving technologies in the face of rapidly escalating rises in energy costs.

Many studies document energy savings for green buildings averaging 30% compared to conventional buildings, with greater savings available for more substantial retrofits. One early study, based on a detailed review of 60 LEED-rated buildings, found LEED buildings to be “25-30% more energy efficient (compared with ASHRAE 90.1-1999 and, for California buildings, Title 24 baselines),” and achieved even lower electricity peak consumption.²² A more recent study by Compass Resource Management based on buildings in Canada and the U.S. found that relative to baseline energy standards, energy savings for LEED buildings averaged 24% at the Certified level, 33% at Silver, 47% at Gold, and 60% at Platinum.²³

A modern HVAC (heating, ventilation, and air conditioning) system alone can cut energy costs by 5% to 15%, depending on the building, according to Johnson Controls.²⁴ For a 200,000-square-foot office building, a 30% savings could translate into annual savings of \$135,000, based on typical utility charges of \$2.25 per square foot. Of course, the actual dollar amount saved will vary by region, with greater savings associated with harsher climates.

Some prominent cases are summarized in box in the following box.

Examples of Energy Cost Reductions in Green Buildings

Adobe Headquarters Complex, San Jose, California

The three owner-occupied buildings recently received the Platinum LEED-EB certification. Adobe invested approximately \$1.4 million for energy and environmental retrofits. In return, these retrofits have resulted in approximately \$1.2 million in annual savings and \$380,000 in one-time rebates.

Denver Place, Denver, Colorado

Utility bills exceeded \$1 million in the mid 1990s when the owner of this multi-tenant mixed-use project adopted energy-saving technologies. The initial retrofit investment was \$1.3 million, of which \$550,000 was funded by the local utility. With initial savings were \$350,000 a year, (which have since risen to more than \$500,000 annually) the year-and-a-half payback resulted in about a 59% return on investment.

Google Headquarters, Mountain View, California

Google has installed almost 10,000 solar panels at its 978,000-square-foot headquarters complex, reportedly the largest corporate solar installation in the country. The 1.6-megawatt project is projected to generate enough electricity to power about 30% of Google's peak electricity demand at its solar-powered headquarters buildings, and is expected to pay for itself in less than eight years.

d) Business Productivity

For most corporations, facility costs rank as their second greatest expense, averaging some 10% to 20% of operating expenses. But these pale in comparison to employee expenses, including attracting, training and retaining, as well as compensating staff, which together can account for a third to a half of all operating expenses. Accordingly, companies are hugely motivated to adopt cost-effective measures that can rein in employee expenses. For example, studies have shown that the cost of replacing a worker – including recruitment, training and downtime – can amount to 100% of an individual's salary. Thus, firms also need to explore every avenue for retaining preferred employees and making them more productive.

So in what amounts to more than just fortunate coincidence, experience is demonstrating that some of the same environmental design features that make buildings less expensive to operate also render the facilities more conducive to contented, productive and healthy workers – a clear double benefit for tenants. Specific benefits vary by the specific design features of each building and the nature of the tenant and its operations, but can be

documented through post-occupancy surveys of tenants. Among the most consistently reported benefits: reduced staff turnover, reduced absenteeism, improved morale and ultimately greater worker productivity.²⁵

For example, the advent of fluorescent lights and air conditioning after WWII made it possible to build deeper rooms that reduced the amount of sunlight that penetrate to the interior of a building. Under more current green building designs, room depths are being reduced in order to bring in more natural light and thereby reduce energy consumption. As it happens, access to ample natural lighting is also one of the single most important building amenities for office workers, and thus a great benefit for firms in terms of attracting and retaining workers.

With labor costs such a high proportion of the overall operating costs of firms and organizations, even small productivity gains can yield attractive financial returns, especially relative to facility costs. One study concluded that the State of California spends 10 times as much on employee compensation and related expenses than on the cost of space per employee. Thus, measures that generate productivity gains of say 1% would be equivalent to reducing property costs by 10%, which translates into about \$3.00 per square foot of space.²⁶ In other words, enlightened tenants should be motivated to pay a premium for space yielding tangible productivity gains, regardless of their energy-saving and other environmental benefits.

Nor are the benefits limited to just office tenants. Increasing natural sunlight has been demonstrated to increase retail sales in stores, improve learning in schools and boost productivity in factories. And, of course, natural sunlight has always been an important amenity for apartment dwellers and homeowners alike, which increases the utility of the real estate itself. More specific productivity examples are provided in the accompanying box.

Combined Energy Cost Reductions and Productivity Gains in Green Buildings

Reno Post Office, Reno, Nevada

The Post Office spent \$300,000 for a new lower ceiling to improve lighting, create better acoustics, and make the building easier to heat; the renovation reduced annual energy costs by a projected \$22,000 and maintenance costs by almost \$30,000. Productivity gains amounted to \$400,000 to \$500,000 annually, more than offsetting the construction costs in less than one year.

The West Bend Mutual Insurance Company Headquarters, West Bend, Wisconsin

Design strategies for the new 150,000-square-foot green building included more daylighting and individually-controlled workstations, resulting in a 16% productivity gain. With an annual payroll of \$13 million the increase was worth over \$2 million each year, in addition to reducing energy costs by about 40% compared to the prior facility.

Lockheed Building 157, Sunnyvale, California

For its planned 600,000-square-foot office building, Lockheed commissioned a design for energy-conscious daylighting, adding roughly \$2 million (4%) to the construction costs. In return, energy savings were worth nearly \$500,000 a year based on reduced lighting and air-conditioning costs. In addition, Lockheed moved a known population of workers into the building and absenteeism dropped 15%, which alone paid for 100% of the extra cost of the building in the first year.

e) The New "Clear 30"

A more mercenary benefit driving tenant demand for green buildings is their very newness, which can induce demand by itself, with green features providing a tangible rationale. A colleague relates the importance of ceiling heights in marketing industrial buildings. For many years, ceiling heights in warehouse and light industrial buildings typically ranged from 18 to 24 feet. In the 1990s, developers began constructing buildings with ceilings up to 30 feet in

height ("clear height"). In reality, few firms need ceilings that high, but developers and owners of industrial properties found prospective tenants increasingly citing 30-foot ceilings in their facility requirements. The reason: only newer buildings have such high ceilings. Savvy facility managers knew that they could not expressly request new construction, but by making the case for 30-foot ceilings, they were able to acquire new facilities nonetheless.

Green buildings have the additional benefit of being built to generally higher quality levels, providing a double lure for tenants. The extent of this strategy with respect to green building demand is not known, but certainly any owner not having a staple of green or otherwise energy-efficient buildings in its portfolio risks not being able to attract firms with those qualities on its checklist.

f) Industry Evidence

Countless surveys document the interest of firms and their employees to work in greener buildings, such as the CoreNet survey cited previously. A recent poll by Monster.com found that more than three-quarters of Canadians surveyed said they would leave their current job for an employer who is "more environmentally friendly." In the retail sector, a new survey by BDO Seidman LLP for the Retail Industry Leaders Association found that 83% of CFOs at the top 100 largest U.S. retailers claim to be "involved in green practices" and 62% of those have increased their green investments during the past two years.²⁷

Beyond these surveys are the words and actions of major corporations. Literally scores of top firms are implementing policies that suggest moves to greener facilities. Few have outright committed to a specific standard such as LEED for all of their facilities: despite the surge in green building activity, the universe of certified buildings is still quite small in any single market, particularly for rental properties, so hewing to such a standard is not yet practical. There is simply not enough product yet available. Nonetheless, many large firms have announced energy or carbon reduction policies that will effectively require them to build or acquire only high-performance or even LEED-certified buildings. The exceptional growth in corporate green construction demonstrates that the attitudes and preferences revealed by this and other comparable surveys are translating into actual tenant demand.

Among the largest high-tech firms in this category are IBM, Dell, Google and Microsoft, while financial services giants include Bank of America, Citigroup and JPMorgan Chase. And a growing number of professional-service firms have committed to leasing only green workplaces including Deloitte & Touche, Accenture and CB Richard Ellis. Retailers have come to the green camp relatively late compared to some other sectors, but are now making up for lost ground:

- Wachovia plans to build at least 300 LEED-certified bank branches by 2010, which will reduce energy consumption by 20%
- HSBC has built its first "zero-carbon" branch, which cuts energy usage through the use of geothermal ground source heat pumps – part of a plan to spend \$90 million over the next five years to reduce its environmental impact
- Macy's is installing solar energy systems at 28 California stores in an effort to reduce conventional power usage significantly.
- Wal-Mart has committed to reducing by one-third the amount of energy consumed by its stores by 2010.
- Fresh & Easy, the new U.S. subsidiary grocer of Tesco PLC, is seeking LEED certification for all of its planned U.S. stores through the USGBC's new LEED volume certification pilot program.

Finally, one of the largest tenant groups also probably has the most consistently high and rigorous green tenancy policies – government agencies. The role of government as tenant is discussed next.

The Role of Government

Public sector policies are accelerating the move to green development through at least four key avenues: tenancy, leadership, regulation and incentives.

a) Government as Tenant

As a tenant, government has been driving green building through the standards it sets for its own occupancy, in conjunction with its dominant market influence. State and local governments around the country have been instrumental in promoting green building standards, but the federal government has been especially impactful, early on setting high bars for its facilities and commissioning pioneering green architecture throughout the country. Indeed, federal policy now requires that their facilities “lead by example in advancing the nation’s energy security and environmental performance.”²⁸

The federal government’s involvement in environmental issues dates back to at least 1970 when President Nixon formed the Environmental Protection Agency “to protect human health and the environment.” But its focus on facilities and offices did not begin until 2003 with the issuance of OMB Circular No. A-11, which called for “an integrated process within an agency for planning, budgeting, procurement and management of the agency’s portfolio of capital assets to achieve agency strategic goals and objectives with the lowest life-cycle cost and least risk.”

More explicit guidance came with The Energy Policy Act of 2005, which required that:

“... sustainable design principles [be] applied to the siting, design and construction of all new and replacement buildings and that new federal buildings be designed to achieve energy consumption levels that are at least 30 percent below the levels established in the 2004 International Energy Conservation Code for residential buildings or the ASHRAE Standard 90.1-2004 for non-residential buildings, if life-cycle cost effective.”

These principles were adopted by 19 federal agencies on January 24, 2006 through the Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding (MOU). Finally, these policies were expanded and extended to all federal agencies one year later through Executive Order (E.O.) 13423: “Strengthening Federal Environmental, Energy and Transportation Management.” Among other mandates, E.O. 13423 requires federal agencies to:

- reduce energy use and greenhouse gas emissions by 30% by 2015, relative to a FY2003 baseline;
- reduce water consumption intensity 16% by 2015, compared to an FY2007 baseline;
- acquire at least 50% of energy purchases from new renewable sources; and,
- construct or renovate buildings in accordance with sustainability strategies, including resource conservation, reduction, and use; siting; and indoor environmental quality.

In implementing this policy, many federal agencies have chosen to adopt strict green building standards for their facilities. For example, the Government Services Administration (GSA), which provides or leases facilities for many civilian federal agencies, now requires all new buildings to be LEED-certified; the Navy mandates LEED-Silver; and the EPA requires LEED-Gold. Technically, these LEED policies apply only to federally-*owned* facilities and not *leased*

buildings. But if agencies are to meet the foregoing energy and greenhouse gas standards, it is not hard to imagine these LEED standards eventually being extended to all federal facilities, leased as well as owned.

These policies are having a huge impact on the construction trends in the U.S. A review of the federal government's real estate footprint reveals why. The U.S. Government is by far the largest real estate owner and tenant in the country. The federal government owns over three billion square feet of space in some 445,000 buildings and leases 374 million square feet of space in another 57,000 buildings. And this portfolio is not static. The GSA alone has an operating budget for buildings of \$2 billion annually and its capital budget over the past two years has been even higher. These figures do not even include the many agencies that control their own space such as the various branches of the military, the U.S. Postal Service, the Department of Veterans Affairs, the Federal Bureau of Prisons, and the Smithsonian Institution, among others.

With this volume of space and activity, federal agencies clearly have a major impact on the kinds of space built and leased in the United States, as reflected in the foregoing analysis of LEED building activity. On a more regional basis, state and local governments can have even greater impacts in specific markets. As of mid-2007, the city of Sacramento, capital of California, has more LEED-certified building area than any city in the country, with over 4.3 million square feet. Its share of LEED building area is 30 times its share of the U.S. population, illustrating the influence of state and quasi-state agencies. In all, some 20 states require LEED certification for either all or nearly all state-owned or state-financed facilities, including California, Washington, Virginia, Massachusetts and Colorado. Florida has gone one step further, prohibiting all state agencies from leasing office space that does not meet Energy Star building standards (unless no other viable alternative exists), while Virginia now gives preference to LEED-certified or Energy Star buildings when leasing private buildings.

b) Government as Leader

Closely related to the government's role as tenant, which depends on the brute force of its market power, is their more subtle power to influence markets, by raising awareness and demonstrating the efficacy of green buildings. In many markets, the federal or local government has constructed the first green building in the area, which thus provides the first close-up exposure tenants and developers have to green building technologies. Since green buildings typically have unique features in a distinctive design, they tend to stand out from conventional structures. On the tenant side, these projects can build awareness, interest and ultimately demand for the product, while on the developer side the products can inspire and encourage new production.

Contrary to perceptions, the public sector does not actually account for a disproportionate share of green building activity. The three levels of government collectively accounted for 19% of LEED building area in 2006 and early 2007. This proportion is well under the public sector's share of total non-residential activity (including major renovations as well as new construction), which averages about 35% based on building value.²⁹ Nonetheless, government's prominence in the green building movement has been enhanced primarily by its early role in seeding green development: the public sector was the tenant in 41% of the LEED building area during the first three years of the program, but this share has since declined to only 21% in the last two years. Also enhancing its leadership: The public sector is responsible for many of the largest, most visible green projects, such as the California EPA headquarters in Sacramento (950,000 square feet), the Pittsburgh Convention Center (1,486,000), the Solano County Government Center (643,000) and the Capitol Area East End Complex also in Sacramento (1,672,000), among many others.

c) Government Regulations and Incentives

Government also influences private green building activity through its regulatory powers. In the United States, land use regulations tend to be the delegated province of local jurisdictions, at either the county or municipal level, though federal and state government laws and rules can indirectly control how and where buildings are constructed, typically by affecting the costs or benefits of development or ownership.

In the case of green building, local governments have only recently addressed the issue seriously, but momentum now seems to be gaining. Scores of municipalities have enacted policies mandating or encouraging green buildings, with most of these ordinances enacted just in the past couple of years. These policies fall into three general categories:

- requirements that all new construction or renovations (typically above a certain size) achieve a minimum LEED or other green certification;
- planning incentives, such as density bonuses or expedited permitting, for projects achieving specified environmental standards; and,
- financial incentives, such as grants or reduced taxes, for projects incorporating specified environmental features.

Together these and many other similar laws suggest that local governments are increasingly eager to tip the scales to green building. Included in this category are the policies of quasi-public bodies such as utilities that frequently offer rebates to owners and tenants undertaking energy-reducing improvements.

Sampling of Local Government Green Mandates and Incentives		
Jurisdiction	Date	Regulation
Boston, MA	2007	Zoning Code is revised to require LEED-NC certification for all public and private development projects over 50,000 SF.
Chicago, IL	2007	The Department of Construction and Permits expedites permitting for projects that incorporate innovative green building strategies, including LEED certification.
Los Angeles, CA	Jul 2007	Private-sector green initiative requires all projects greater than 50,000 SF, or 50 units, meet LEED standards. In addition, the city is planning an expedited process for projects that meet or exceed LEED Silver.
Portland, OR	Jun 2005	Resolution adopts LEED-NC Silver standards for all private-sector projects over 10,000 SF that receive public funds totaling over \$200,000 or 10% of the total project costs.
San Francisco, CA	Sep 2006	Planning Department Director's Bulletin gives priority permit review to all new and renovated buildings that achieve LEED Gold certification.
Santa Monica, CA	Aug 2005	Ordinance expedites permitting for LEED-registered projects.
Seattle, WA	Apr 2006	Zoning update provides a height or density bonus to commercial or residential projects that achieve at least LEED Silver certification and contribute to affordable housing.
Sunnyvale, CA	Jan 2004	Ordinance updated the city's building codes in areas zoned for industrial use to allow a density bonus of 5% FAR for buildings that achieve a minimum of LEED-Certified.
Town of Babylon, NY	Nov 2006	Local law that requires LEED certification for any new construction of commercial buildings, office buildings, industrial buildings, or multiple residence over 4,000 SF.
Washington, DC	Dec 2006	Beginning in 2008, tenants of District-owned commercial buildings that improve a space of at least 30,000 SF must achieve LEED-CI certification. Starting In 2009, all new construction or major renovations to private, non-residential buildings 50,000 SF or more must outlining green features that will be pursued. After 2012, non-residential and post-secondary educational facilities shall achieve LEED-NC or LEED-CS certification.
Sources: USGBC and RREEF Research		

This movement likely will be accelerated by another development: the mass revision of building codes across the nation. The driver will be the first major update to the energy efficiency-standards that have underlain building codes worldwide since the 1970s.

The American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE), in conjunction with the USGBC and the Illuminating Engineering Society of North America (IESNA), is updating the current standards, known as "ANSI/ASHRAE/IESNA Standard 90.1,"

with new standards that are at least 30% more efficient and achieve equivalent carbon emissions reductions. The revised standard, called "Standard 189P" for the "Design of High-Performance Green Buildings Except Low-Rise Residential Buildings," is due to be released by the end of this year. ASHRAE and its partners then intend to lobby state and local governments to implement the standard.

Given the industry respect accorded both ASHRAE and IESNA, Standard 189P can be expected to be adopted quickly and widely, thereby setting a new baseline for the energy-efficiency of all future buildings. As a result, at least as far as new construction and major renovation is concerned, green building may quickly move from voluntary to mandatory standards, certainly in the nation's major commercial hubs.

Finally, action by the federal government is likely. The federal government only rarely intervenes directly in the regulation of private-sector construction, such as where issues of great national concern are involved. One notable example: the Americans with Disabilities Act (ADA), enacted in 1990, which, among many other provisions, required enhanced accessibility for all new public and commercial facilities and those undergoing renovations above a stipulated level. The U.S. government is not likely to initiate comparable mandates with respect to green building, but may still wield a distinct influence through more comprehensive regulation of greenhouse gases.

With the vast majority of Americans believing that the federal government should act to address global warming, Congress has started to consider proposals for limiting greenhouse gas emissions. Currently at least five bills are being formulated in the Senate, in addition to local initiatives in Austin, Portland, and Seattle, which are considering programs of their own. The major approaches fall into two camps:

- a carbon tax or carbon-emissions tax, in which a tax is assessed on either all emissions or those above a certain threshold; and,
- a cap-and-trade program, in which emissions for different land uses are capped at designated levels and polluters (the facility owner or operator) exceeding the threshold must purchase emissions rights from other land users whose emissions fall below the threshold.

The polluter can avoid paying the tax or purchasing the emissions permit by investing in technologies that reduce their emissions to the appropriate level – the ultimate goal of these initiatives. At this point, it is impossible to handicap when and what type of program will ultimately be adopted, particularly given the current Administration's aversion to mandatory controls. Nonetheless, with even the electric power industry calling for federal action, some sort of program seems likely to be adopted within the next few years. Equally likely, real estate will be a primary focus of the program, providing even greater incentives for property owners to reduce their energy usage or face even greater operating costs. Thus, even without changing building codes directly, these programs can indirectly control building standards by affecting the costs of development or ownership.

Investor Demand

Another ingredient in the maturing market for green buildings has been the rising willingness of institutional investors to finance new construction, rehab and upgrade older buildings, and purchase completed projects. Though slower to emerge than the tenant-driven demand from owner-users in the public and corporate sectors, investors are finally recognizing the opportunity to profit from green building investments and are getting more comfortable with the product. This demand reflects both "push" and "pull" factors.

a) Push Factors

Pushing investors into this arena have been the same societal forces propelling socially-conscious investing – the desire among an increasing share of investors to feel good about the uses to which their capital are devoted. A key driver here is the Responsible Property Investing (RPI) movement, supported by academics and major institutions such as the United Nations. With a motto of “doing well while doing good,” advocates of RPI stress triple bottom line accounting that tracks environmental and social impacts, as well as the traditional financial returns (memorably termed “planet, people, profits” by one green developer).

RPI is becoming especially common with public pension funds, which account for a large share of real estate ownership in the country. Pension funds are hearing from their plan participants and directors, who are advocating more responsible investing, including greener buildings.

The Boards of both California Public Employees' Retirement System (CalPERS) and California State Teachers' Retirement System (CalSTRS), two of the largest and most widely respected pension funds, have promulgated guidelines advocating green policies (Green Wave) for their investments, including real estate, where prudent. In addition to actively seeking to build or acquire green buildings, they have also established goals to reduce energy usage in their portfolios of existing buildings by 20% over a five-year period.

These investment policies acknowledge the supremacy of fiduciary responsibilities to plan participants and beneficiaries when considering any green or other social goals. Nonetheless, the willingness of these pension systems to emphasize sustainability in their investment decisions is significant in establishing the legitimacy of this product, in part because these organizations carry considerable weight among institutional investors by dint of their portfolio size and visibility. CalPERS alone has almost \$20 billion invested in real estate, making them one of the nation's largest fund investors.

Capital flows from foreign countries is another force for change. As noted previously, the real estate community has been more proactive on environmental issues in many western countries outside the U.S., in part due to stricter regulations. Foreign-based firms like ProLogis have been leaders in exporting their green business practices to North America. To the extent that sustainable buildings are more commonplace in their home countries, international investors and developers bring both elevated expectations and product knowledge to their U.S. real estate investments.

b) Pull Factors

The other force behind rising investor demand is the “pull” side – the increasingly attractive investment opportunities presented by green buildings. Despite an ongoing debate as to whether green buildings should be viewed as a distinct investment product, the rising prevalence of green real estate funds suggests that a specialized market does indeed exist. CalPERS has formed a \$500 million fund with Hines, known as the Hines CalPERS Green Development Fund (GDF), focused on LEED-certified projects. CalPERS and Hines previously collaborated on 1180 Peachtree in Atlanta, the first high-rise office building in the Southeast to be certified gold in the LEED-CS development program, and now they are nearing completion of their first project in the GDF venture – the 412,000-square-foot Tower 333 office development in Bellevue, Washington. Other private equity investors are staking their own claims as well, as shown in the accompanying box (next page):

Recent Green Development Funds

- Koll Development Co. and Prudential Real Estate Investors are rolling out a second \$200-million tranche for their LEED-certified Intellicenter office development program.
- Thomas Properties is known to be negotiating with CalSTRS for a \$500 million green development fund, and has already completed the 950,000-square-foot California EPA Headquarters Building in Sacramento, the first high-rise office building to receive LEED Platinum certification.
- The Rose Smart Growth Investment Equity Fund, capitalized with \$100 million, takes a different approach, focusing on acquiring existing real estate located near transit stations or in walkable communities, and “enrich[ing] these assets with green management practices.”
- Revival Fund Management has launched a \$150 million urban green real estate fund for high-net-worth investors, seeking to develop or renovate buildings to LEED standards.
- Many other funds are being formed, including the Green Living Fund in Santa Cruz, California, a \$100 million fund focusing on residential and mixed-use projects, and the New Commons Fund in Denver, with initial funding of \$50 million and planned to grow eventually to \$200 to \$300 million.

In the public markets, the Forward Funds of San Francisco has established Forward Progressive Real Estate, the first REIT mutual fund to focus on socially and environmentally-oriented real estate management companies, with net assets of \$50 million. Similarly, progressive investor services are emerging to screen REITs for individual investors and foundations, focusing on firms with a solid sustainability focus. Among the REITs cited consistently: ProLogis (industrial), Simon Property Group (shopping centers), SL Green (office) and Archstone-Smith (apartments). Not coincidentally, a recent study found that two thirds of U.S.-based REITs currently or intend to pursue green building strategies.³⁰

Industry Support and Pressure

Various other industry forces are also moving more developers and investors into the green building arena. Major industry groups such as ULI, BOMA, NAIOP and ICSC have adopted strong pro-environmental stances, pressuring those not otherwise sympathetic to the cause while providing cover for those more favorably disposed but reluctant to act. For example, BOMA just signed an MOU with the Clinton Climate Initiative (CCI) in support of its Energy Efficiency Building Retrofit Program, which aims to promote the retrofitting of existing structures with more energy-efficient products and technologies. BOMA's industry clout previously was instrumental in the widespread adoption of Energy Star. Its endorsement of the CCI principles is likely to move the industry toward even greater energy efficiency.

Secondly, these industry groups are raising awareness of the opportunities and serve as clearinghouses of information for how interested parties can successfully incorporate green sensibilities into their own projects and investments. The proliferation of green-themed industry functions and workshops is leading to the rapid and widespread dissemination of critical knowledge.

The New Financial Calculus of Green Buildings

Finally, and for most investors, most importantly, is the business case for green buildings based on their operating and financial performance. At this point, the universe of true investment-oriented green buildings is still too limited to reach definitive conclusions. Nonetheless, the available evidence suggests a compelling investment case for green buildings.

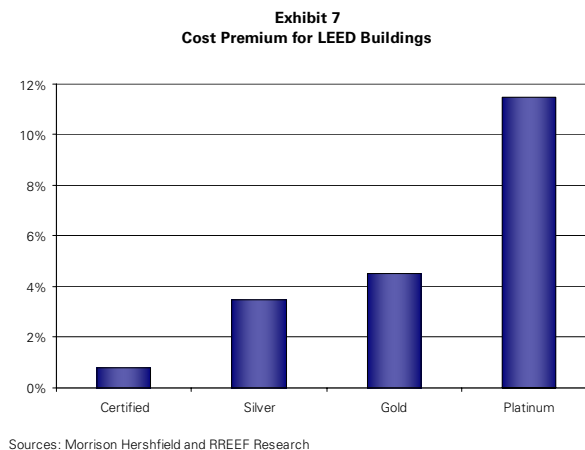
a) Cost Structure – New Construction

Green buildings are widely believed to be significantly more expensive than conventional buildings – a misconception that persists to this day, even among real estate practitioners. Several surveys have found that even seasoned real estate and construction leaders dramatically overstate the cost differential – typically estimating a premium of about 15%.³¹ In fact, the cost premium for LEED buildings in the United States is believed to be much less, even after taking into account the special costs required for obtaining LEED certification, such as application and documentation fees, consultants, and other miscellaneous items.

Part of the misperception about green building costs can be attributed to confusion over the product. Many people assume that only the greenest of buildings – those using *all* of the available technologies – qualify as green; in fact, there are different levels of green. Also, the generally superior quality of green buildings constructed to date sets unrealistic quality expectations, so people wrongly assume that green buildings must be built to a Class A+ level, whereas green buildings can be constructed at varying quality levels and price points.

The first careful study on this subject, by environmental consultants Capital E in 2003, examined 33 LEED office and school buildings. The study found the overall cost premium for green buildings to be about 2%, averaging 0.7% for the LEED-certified buildings, 2.1% for the LEED-Silver, 1.8% for the LEED-Gold, and 6.5% for the one LEED-Platinum building.³² The study also found that cost premiums declined as regional experience in green building increased. Although the small data set did yield some questionable anomalies, such as the cost premium for LEED-Gold being slightly below that of LEED-Silver, the overall finding of a *di minimis* cost premium was conclusive.³³

A more comprehensive 2005 study by the engineering firm of Morrison Hershfield reviewed four U.S. studies estimating the construction cost premium required to meet different levels of LEED certification. They found the cost premiums averaged only 0.8% for the LEED-certified buildings, 3.5% for the LEED-Silver, and 4.5% for the LEED-Gold, but jumped to 11.5% for LEED-Platinum buildings (Exhibit 7).³⁴



The emerging consensus among those most experienced with green development is that with careful upfront planning and integrated design of the sustainable concepts, the cost premium can indeed be minimal to non-existent, and well within the normal range of early-stage cost contingencies; from there, further cost reductions through the value-engineering process often bring down projected premiums when the building is actually constructed.

In reviewing these studies and analyzing actual project budgets, several reasons emerge for the limited cost premium. First, contrary to popular belief, many green features are not necessarily more expensive but just differ from the products and approaches commonly used in conventional buildings. Second, as with any new technology, developers, architects and engineers all become more proficient as they gain greater experience with the product. Third, the expanding market for green products is attracting more suppliers and bringing ever more innovative approaches to the market, which ultimately drives down costs.

Finally, green buildings are eligible for a variety of incentives that can more than offset the putative cost premiums. Local governments and utility companies can offer generous incentives including rebates, tax abatements, expedited permitting and density bonuses. But it is not only the public sector that is rewarding green buildings. A growing roster of lenders is offering more favorable financing terms for green developments, while some insurers offer discounts on property insurance.

With such small cost premiums, the costs of going green are more than offset by the substantial energy expense savings, often within the first year of operation. Thus, the net financial benefits for new green buildings are clear even before considering the market performance of green buildings for investors.

b) Cost/Benefit – Existing Buildings

The costs and net benefits of renovating existing buildings to green standards is much less clear because the extreme diversity of the standing stock (e.g., age, condition, quality, style of construction) makes blanket statements essentially meaningless. In any case, RREEF Research is not aware of any large-scale study examining the feasibility of renovating existing buildings to LEED standards. A total of only 47 buildings have reached LEED-EB status as of mid-2007, half just in the past 18 months, so the pool of projects is still too limited and recent for definitive study.

The record is unambiguous with respect to energy-efficiency initiatives, however. Many studies have clearly documented the feasibility of undertaking appropriate energy-efficiency retrofits. One early study by the Energy Cost Savings Council in the late 1990s examined over 1,000 energy retrofits and concluded that the average payback period was just over three years, with an average Return on Investment (ROI) of 32.4%.³⁵

More recent research by the Environmental Protection Agency demonstrated that a recommended set of efficiency upgrades costing \$2.30 per square foot yielded *annual* savings of \$0.90 per square foot based on energy use reduction of some 40%. The various components had payback periods ranging from one to six years, with an overall average of 2.5 years. Moreover, the internal rate of return for the investment over a ten-year hold amounted to over 40%.³⁶ With the recent dramatic rise in energy costs, the net payoffs are undoubtedly even greater today.

Little wonder, then, that so many major property owners voluntarily entered the Energy Star program. Equity Office, TrizecHahn, Arden Realty, and The Durst Organization, among many others, have undertaken well-publicized energy upgrades to their portfolios, with significant energy reductions and positive financial returns. Still unknown at this point is whether going the next step to LEED or other green certification yields additional market returns.

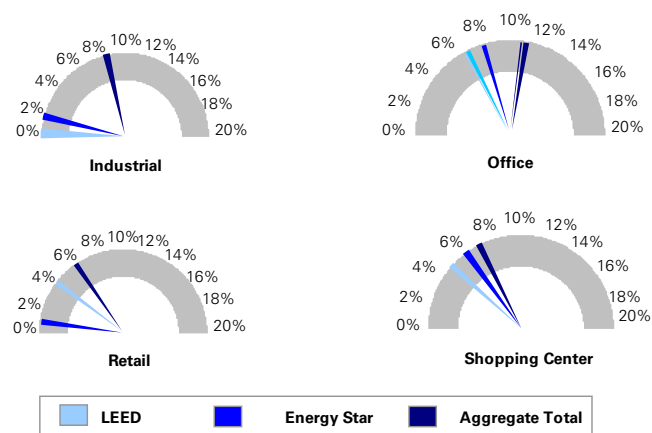
c) Operating Performance

Beyond costs, the most important metric for property owners is the extent to which environmental consciousness actually translates into product demand and thus superior

building performance for green buildings. The preferred test would be a comparison of match pairs, identical save for their green features. This approach is unrealistic, of course, as the vast majority of green buildings are new structures that are fundamentally different from conventional buildings, so direct comparisons are meaningless. More realistic would be before-and-after comparisons of structures renovated to green standards, but the results from these buildings may not be relevant to new construction, and in any case, the universe of such conversions is extremely limited.

Accordingly, the simplest, if imperfect, approach is to compare the average operating performance of green buildings with the universe of conventional buildings. Toward that end, RREEF Research drew upon the CoStar database, which as of this writing had 307 LEED-designated (all levels) and 626 Energy Star buildings on which they provide basic performance data. These counts compare to a universe of well over one million conventional buildings. As shown in Exhibit 8, both LEED and Energy Star buildings consistently outperform conventional buildings, with uniformly lower vacancy rates.

Exhibit 8
Vacancy Rates of Green Buildings vs. All Buildings



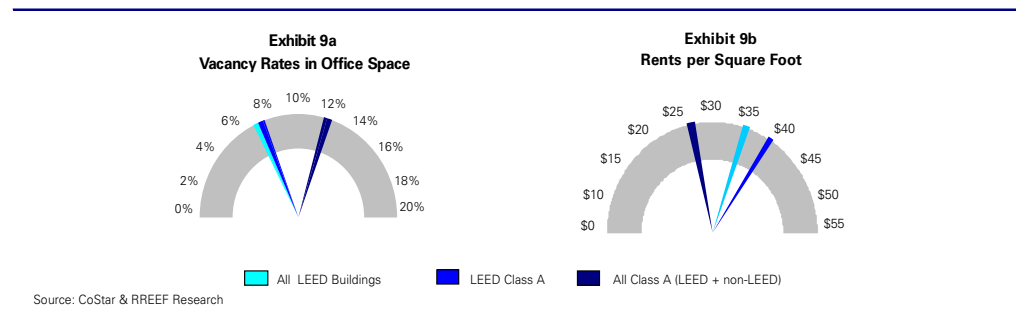
Source: CoStar & RREEF Research

No doubt problems inherent in this data set accentuate the differences. For starters, green buildings tend to be newer higher quality, and thus not strictly comparable to the typical conventional building. Moreover, green buildings tend to be owner-occupied or net leased, which can distort the vacancy statistics, particularly for industrial buildings. Finally, the number of green buildings in some categories is too small to yield meaningful results: there are only five industrial buildings listed with an Energy Star rating, and only seven shopping centers listed with a LEED designation.

Despite these limitations, clear patterns emerge: for every sector tested, vacancy rates for both Energy Star and LEED buildings are below those for conventional buildings. In the office sector for example, 6.9% of the space in the LEED buildings and 8.1% of the space in Energy Star buildings are vacant, compared to 11.2% in the entire CoStar inventory.^{††} Overall, the vacancy rate in all sectors together is 6.1% for LEED space and 8.0% for Energy Star buildings, compared to 8.6% for all buildings.

^{††} The vacancy rates tracked by major brokerages tend to be 150 to 200 basis points higher, but do not include owner-occupied buildings included in the CoStar database, which lowers average vacancy rates.

To make more parallel comparisons, RREEF Research conducted a second analysis in which the product type was narrowed to just Class A office space. CoStar lists 232 LEED-designated office buildings for which they provide basic performance data, of which 114 are classified as Class A. This compares to a universe of over 14,000 Class A office buildings in CoStar. Here again the pattern is clear, with LEED buildings, both Class A and not, outperforming non-green buildings. The Class A green office buildings maintain vacancy rates well below those of conventional buildings – 7.4% vs. 11.6%. Space in the LEED buildings also remains vacant for a shorter period, an average of 20.4 months for LEED office space, compared to 22.3 months for all Class A office buildings. Finally, LEED buildings also achieve higher rents, with an annual average rent of \$37 per square foot for all LEED office space and \$39 for Class A LEED space, compared to \$29 for all Class A office buildings (Exhibits 9a and 9b).



These data sets clearly suffer from issues of limited comparability across product classes and the small universe of green buildings, which can undermine the voracity of the analysis. Still, the data reveals consistent patterns supporting anecdotal evidence that green buildings lease up quicker, at higher rents, and maintain higher occupancy levels.

d) Financial Performance

Perhaps the most important issue of all for potential investors in green buildings is their financial performance relative to conventional buildings. Investors want to know if green buildings trade at lower capitalization rates or yield higher returns on investments. Logically, green buildings should trade at elevated values relative to conventional buildings, if for no other reason than their lower energy and maintenance costs, which translate into greater net operating income. Lower cap rates can be postulated because the mechanical systems of green buildings are constructed to have longer lives (a premise of life-cycle costing). But the extent to which these aspects actually translate into asset value is not yet documented, as few green buildings have yet been sold. In fact, the volume of transactions is so small that Real Capital Analytics, a leading analyst of real estate transaction trends in the U.S., does not yet track green buildings sales, though they have informally indicated a willingness to analyze these sales once the volume justifies separate reporting.

The CoStar database includes only 26 green buildings sold after being designated as green, of which seven were part of a multi-building acquisition by Pfizer, leaving a total of only 20 separate transactions. Half of these were purchased by owner-users like Pfizer, Ford, and Sabre, and one was a net leased building leased to a single tenant, Genzyme. Thus, the entire universe of LEED buildings sold, as tracked by CoStar, amounts to less than ten – certainly not nearly enough to be the basis for any meaningful analysis. Thus, definitive conclusions on value and cap rate differentials will remain an elusive Holy Grail, at least for now.

Other study approaches have reached positive conclusions for green buildings, but suffer from fatal flaws. One widely-cited study by McGraw Hill reported green buildings command 3% higher rents, 6.6% higher returns and 7.5% higher values, but these conclusions were based

solely on industry opinions expressed in a survey of architects, engineers, and buildings owners.³⁷ Another elaborate study calculated long-term internal rates of return for green buildings at various levels of LEED and found outsized returns at the Certified and Silver levels, close to market returns at the Gold level, and below-market returns at the Platinum level.³⁸ However, these calculations were based on hypothetical buildings and estimated construction costs, and not actual transaction and cost data.

A more promising approach was taken by Innovest Strategic Value Investors, which examined the stock market performance of 36 publicly-traded real estate companies relative to their involvement in the Energy Star program, divided into three categories: active participants, less-active and not active at all. The study found a direct, positive correlation between participation in the program and share performance: the stock value of active participant companies rose an average of 33% over the two-year period analyzed, compared to 26% for the less-active partners, and only 20% for the non-participants.³⁹ While this study supports the basic premise of green building investment, its value is limited by the age of the study, which was completed in mid 2002 and because it does not directly analyze green buildings, merely energy-efficient buildings. Finally, the study provides no insights into the feasibility of individual investments.

Thus, at this point the best evidence is what can be inferred from the combination of the cost, energy-savings and operating performance data. In short, green buildings may not cost much more to build than conventional buildings but can yield substantial operating cost savings and tangible benefits for tenants, which seem to translate into higher rents, lower vacancies, and quicker tenant absorption. Add in the subsidies available to greener buildings, and a favorable return profile relative to conventional buildings seems probable, if not certain.

Factors Limiting Green Building Adoption

With so much compelling evidence supporting green building development and investment, the question remains as to why green building investment has been so limited to date. Notwithstanding the recent surge in construction and renovations, green buildings still account for only a minimal share of current construction. Last year saw the construction of over 15.5 million square feet of LEED-designated office space. But two thirds of that space was built by corporate or public-sector owner-users, leaving only 5.6 million square feet of speculative space constructed by developers. This amounts to only 11% of the 49.4 million square feet Torto-Wheaton estimates was added to the rental office inventory nationwide in 2006 in the nation's top 62 metros. And the green share of the total standing stock is obviously much less. Based on CoStar data, RREEF Research estimates that LEED-designated Class A office space represents well under 2% of the total Class A office stock.

Several forces are holding back green building activity, particularly by third-party investors, including awareness; and experience, the lack of reliable data sources and metrics, and a misalignment between who pays and who benefits.

Awareness and Experience

The first issue limiting green building construction has been simple **lack of awareness**. LEED buildings are now located in all 50 states and some 400 cities around the country. However, 32 cities with five or more properties account for about 40% of green assets nationwide. If we exclude public-sector owners, there are only 50 cities with more than one private LEED project and fewer than 20 with more than three projects apiece, and many of these have been constructed only in the past two years. Thus, in many metros, few developers or investors can point to – or walk through – a local green building.

Second is the **experience curve**. Developing green buildings successfully requires specialized knowledge throughout the organization for initial project conception, design, marketing, permitting, certification, and operations. New business partnerships must be struck with architects and engineers, lenders, insurers, brokers and managers who have green-building chops. Attaining the needed in-house experience and forming these business relationships takes time and represents a significant investment, particularly for smaller players.

A related issue is the **limited supply of trained professionals**. USGBC now has certified over 40,000 professionals for its LEED program, but two years ago the figure was half that, and the number of truly experienced professionals in the more specialized fields such as architecture and engineering is still quite limited. In smaller markets, there may be few, if any, experienced professionals. The small number of LEED certification specialists also presents an industry-wide bottleneck.

Data Sources and Metrics

Institutional interest in green buildings also has been constrained by the **lack of** a comprehensive and transparent set of operating and transaction **data and reference material** that are standard for other real estate product types. This problem is compounded by the Catch-22 paradox noted previously: many investors are awaiting a more definitive track record before committing to green buildings, which thus limits development of the investment-quality green product that could provide this performance history. This issue is even more significant with regard to renovating existing non-green buildings up to green standards, where case study data on the benefits is especially thin.

Moreover, the industry has not yet even settled upon a common set of **metrics and definitions** for green buildings. A new industry think tank, the Green Building Finance Consortium, has been formed to grapple with these issues, but their efforts are just getting underway. The appraisal profession also has yet to conclusively determine how green features translate into asset value, as lenders have yet to agree on how green figures into underwriting criteria. Industry consensus and standards thus may be still years away.

Who Pays, Who Benefits, and When?

Currently the investor share of green building ownership, excluding net-leased buildings and similar arrangements, amounts to under 20%. A key reason is the **misalignment** between owner costs and tenant benefits. Many of the benefits of green buildings, at least for now, seem to accrue to the user (as opposed to the non-occupying owner) of the property; nor is it clear that tenants *fully* compensate landlords for the value of these benefits. Since government agencies and major corporations own a greater share of their facilities as compared to other types of tenants, these sectors have been better positioned to internalize the benefits from green buildings.

A related issue mentioned earlier: despite the evidence of growing tenant awareness and demand for green buildings, it has not yet been definitively established that tenants are, if fact, willing to pay a rent premium for these features. Thus, prudent developers and investors might be wary of adding green features with **unproven market acceptance**.

Another reason is that **life-cycle costing**, a central premise of the green-building business case, typically assumes a much longer amortization period – 20 to 30 years – than the typical investor's holding period. One frequently cited statistic is that employee and operating costs constitute 80% to 90% of a property's life-cycle cost (*i.e.*, initial construction costs account for only 10% of costs).⁴⁰ However, this conclusion only has relevance to owner-users holding the facility for an extended period. Similarly, some benefits of green buildings have **earn-back**

periods exceeding the typical holding period for investment real estate, which is generally five to ten years (and shorter for “value-add” investments). Most investors would only consider investments with payback periods comfortably shorter than the intended (remaining) hold, in part because of investor pressures and financial incentives to raise shorter-term returns. However, with rising energy prices, this issue is becoming less significant.

For all of these reasons, green buildings generally tend to be preferred more by government agencies, major corporations and owner/users of real estate, all of whom tend to have longer investment horizons, and can better capture tenant benefits for their account, than can typical institutional real estate investors.

Getting Certified

A final factor favoring owner-users (and long-term lessees) over pure investors in pursuing green buildings is that LEED-NC, the original and by far most commonly-used LEED standard, effectively can be earned only by owner-occupied (or net-leased) buildings since many of the points needed to qualify for certification are controlled by the tenant. LEED-CS, a standard more appropriate for speculative commercial buildings in which the tenants are not known in advance, was not released until last year. Thus, investors were effectively discouraged from participating in the LEED program until only recently, but their share of the pie is rising quickly with the release of LEED-CS.

What’s Next for Green Building?

All available indications suggest that green investment is poised for tremendous growth in the coming years. The number and building area of LEED projects have increased each year since 2001, and expectations for 2007 based on the volume certified through mid year suggest this pattern is continuing unabated – despite a slow-up this year in overall commercial construction. Looking forward, one clear indicator of prospective activity is the number of projects applying (“registered”) for LEED certification. *Over 8,000 commercial projects are now in the LEED pipeline, more than double the number last year and seven times the number cumulatively certified to date.* The number of projects registered in the Core and Shell program has risen almost five-fold in the last year alone.”

Clearly, green investment is catching on. Industry familiarity with green building technologies and awareness of investment opportunities has expanded with the already dramatic growth in the number and dispersion of green projects, as well as the greater focus on green building at professional events. Developers and investors are gaining more understanding of the business case for green building as more data and studies demonstrating the feasibility and benefits of green building are published.

Plus, the business case itself is changing for the better. Rising energy costs are increasing returns and reducing the payback periods for energy-saving technologies, while growing industry experience is bringing down development costs. And the burgeoning market for green technologies is encouraging the introduction of ever more products and approaches, further driving down construction costs.

Facilitating this growth is the rise in the number of LEED-NC-accredited professionals, which has grown from less than 2,500 in 2002 to 20,000 in 2005, and now exceeds 40,000. These professionals – architects, planners, builders – not only will be forceful advocates for green building, but also will help accelerate the pace of green certifications.

^{ss} These figures are cumulative through October 2007, while the database analysis was current through May 2007.

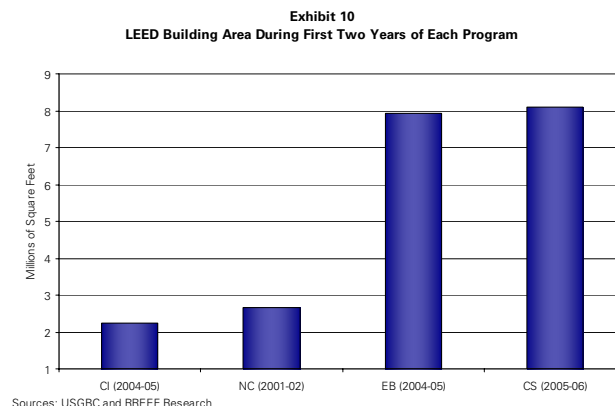
Adding fuel to the movement is the increasing tenant demand for green facilities. Currently the federal government, the nation's largest landlord and tenant by far, builds and renovates only to LEED standards. It is not hard to imagine the GSA requiring LEED-certified buildings for all of its leased facilities as well, particularly with the growing environmental consciousness in Washington. Major private-sector tenants are following suit. Of course, with so little green rental product available, not all of this demand can yet be satisfied, since green product still accounts for less than 2% of the Class A office inventory nationwide. In the short term, this demand will be reflected in lower vacancies and higher rents for the relatively few buildings available for lease. But longer term, this potential demand should send strong signals to developers to ramp up production of green rental product.

Much of the capital for this development will come from the traditional sources financing real estate; pension funds, commercial banks, private equity, insurance companies and the public markets, particularly as capital providers become more comfortable with the market. But an additional infusion of capital can be expected from the RPI movement. One study estimated there was \$2.3 trillion in socially responsible investments in the U.S. as of 2005. If these investors in the U.S. allocated 10% of their funds toward real-estate, a typical share for pension funds, they would own two-thirds of the total capitalization of U.S.-based REITs, suggesting a tremendous pent-up demand for green and other socially-conscious investments.⁴¹ Thus, the RPI movement represents an opportunity for developers and property owners to tap into new and different sources of capital.

How High is High?

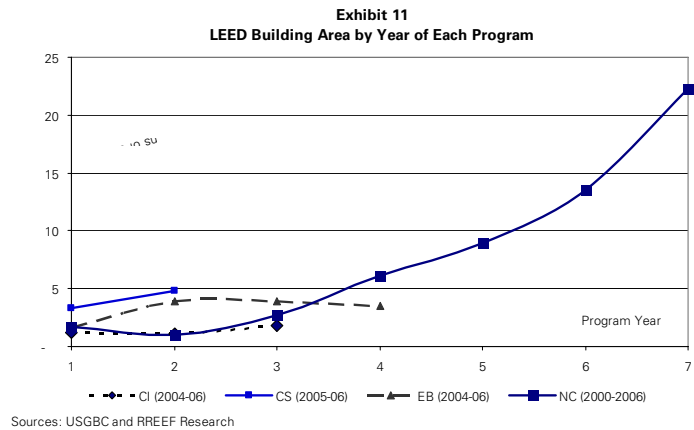
Projecting future growth based on a limited development history can be a perilous exercise; many variables can alter the ultimate outcome. Nonetheless, Research RREEF expects that green building activity over the next five years will be considerably greater than in the preceding five. This conclusion can be supported by several different approaches.

One harbinger is the clear popularity of the newer LEED-CS and LEED-EB programs, each of which had far greater activity in their initial years than did the LEED-NC program (Exhibit 10). Moreover, these new programs seem to be additive, that is, expanding the base of participation, rather than taking away from the LEED-NC program, which has continued to grow even faster since LEED-CS and LEED-EB were added to the mix.

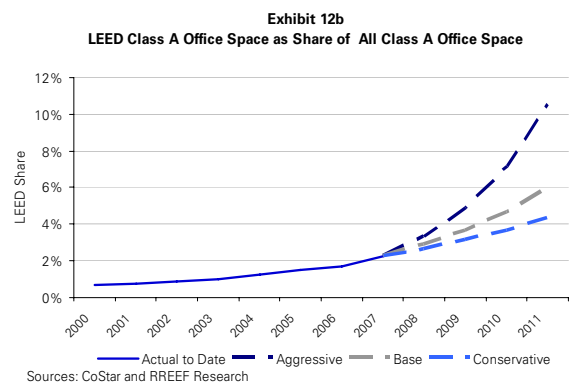
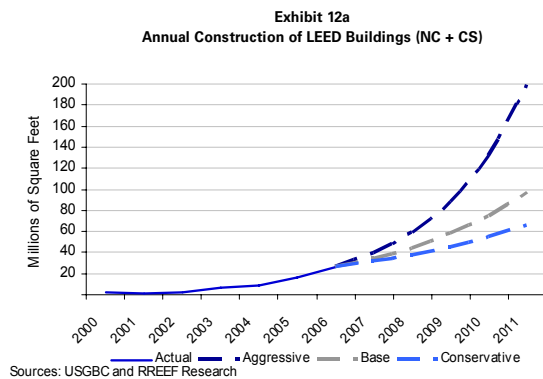


Were these programs to exhibit similar growth patterns as the LEED-NC program, future LEED building growth would indeed be explosive: The amount of space certified under the LEED-NC program in 2007, the seventh year of the program, was 8.4 times the combined amount of the first two years, or 22 million square feet last year (Exhibit 11). As this same

rate, LEED-EB would certify 66 million square feet in 2010, while LEED-CS would certify 68 million square feet in 2011, their respective seventh years. These two programs alone would thus shortly exceed the 96 million square feet certified in all LEED programs to date.



For perspective, during the past three years, new LEED construction (LEED-CS and LEED-NC combined), has been growing at a compound average rate of about 50% per annum. Clearly this growth rate cannot be sustained indefinitely – nationally, the commercial development growth rate averages about 2%. Nonetheless, were growth to continue at this 50% rate for only the next five years, the amount of new green construction would rise from 21 million square feet last year to almost 200 million square feet in 2011 – ten times the current volume but still less than an eighth of 1.5 billion square feet of non-residential space constructed annually in the U.S. in this decade.⁴² This growth-rate is labeled the “aggressive” scenario is the following exhibit, with the “base case” at 30% and “conservative” at 20% (Exhibit 12a). The aggressive growth scenario would result in a green market share exceeding 10% of Class A space within five years, up from about 2% now (Exhibit 12b).



Is this amount of growth is realistic? The most widely-cited forecast on this matter was published by McGraw-Hill Construction, which last year projected that the value of annual commercial and residential green building combined will total between \$29 billion and \$59 billion by 2010, compared to \$10.2 billion in 2004.⁴³ Even with this broad range of outcomes, the McGraw-Hill projections seem conservative. Their projections equate to only three to six times the volume in 2004. However, by 2006, after only two years, the building area of new green construction already has reached 2.4 times the 2004 volume. With construction in the

green sector growing at an exponential rate, the McGraw-Hill projections do not seem to have fully captured the scope of future green construction activity.

Market Opportunities and Strategies

Regardless of the specific construction volumes, RREEF Research believes outstanding opportunities for developers and institutional investors exist to participate in the greening of U.S. real estate – as well as some challenges.

a) New Construction

The greatest and easiest opportunity will be for new construction. With construction costs of green buildings now within the range of normal contingency factors, in many markets it will be hard to justify *not* building green – even if the precise level of occupancy and rent premiums for green buildings are not yet clear. Early adopters of green building can anticipate reaping above-market returns in the near and even intermediate term, as construction fails to keep pace with the exploding demand. These premiums should erode somewhat over time as green building expands and the scarcity of green product declines, though rent premiums for net leases should endure relative to less energy-efficient buildings.

Target tenants: Large corporate and government tenants will continue to dominate the green building market, particularly through build-to-suit and net-lease arrangements. These tenant groups have staked out visible initiatives to be more environmentally sensitive, and also can better capture the range of green building benefits through full-building solutions. Because green building performance depends on the occupant's unique operating characteristics, prospective or actual clients will need to be involved earlier and more extensively in the conceptual and design phases.

Universities also will continue to be major clients for green building as literally hundreds of schools have adopted green-only development policies. As with the government sectors, major opportunities will be through build-to-suit and net-lease arrangements.

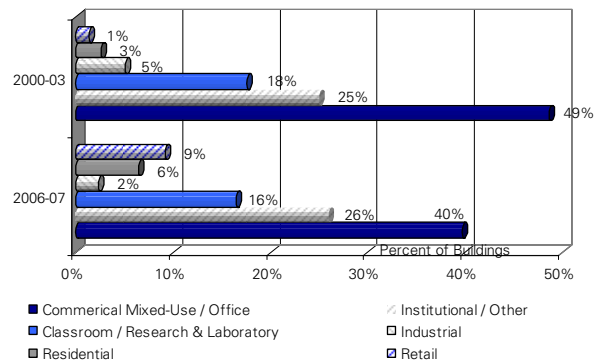
However, development opportunities will not be limited to these large tenants. With rapidly growing environmental awareness and concerns, developers can expect to field growing demand for green product at a variety of price points. Already speculative office and retail are sprouting up around the country, and many more can be expected to follow the trail blazed by the pioneers.

Target markets and locations: Despite the broad dispersion of green buildings throughout the country, tenant demand for green buildings still tends to be highly concentrated in more politically-liberal metros. Ironically, many of these markets are located in temperate regions in which green buildings yield relatively lower cost savings. Over time, green building demand is likely to grow in less-moderate climates, particularly if energy prices remain elevated.

Within metros, urban submarkets, especially brownfield and other previously-developed sites, will generate the most interest. Infill sites with access to public transit or walking distance from residential populations will be increasingly valued over more distant greenfield sites.

Target product types: Green building activity is dominated by office buildings and mixed-used projects, institutional facilities and educational buildings, which together comprised 82% of LEED project developed during 2006 and early 2007 (Exhibit 13). Though their collective share is declining, down from 92% during the first two years, there is little doubt that these product types will continue to account for the greatest share of investment and development opportunities going forward.

Exhibit 13
LEED Building Type by Year



Sources: USGBC and RREEF Research

Retail space has shown the greatest percentage rise over the period, and now constitutes almost 10% of all LEED space. This share can be expected to jump further once the USGBC's two pilot retail LEED programs are implemented, especially given the widespread demands from retail tenants for greener stores. Green residential development also is growing, and this share, too, can be expected to escalate once the two pilot residential LEED programs (LEED-Homes and LEED-Neighborhood Development) are adopted. At the intersection of residential and university participation is student housing, which can expect to see tremendous activity.

The only major product group not participating fully in the green movement is industrial, which has accounted for less than 4% of LEED projects to date. This is not to say that tenants of industrial space are ignoring energy efficiency altogether. But warehouses and other lower-end industrial structures are probably the least amenable of any property type to greening strategies and environmentally-appropriate locations. These properties are also not conducive to major upgrades due to their low rent basis. With no major movement afoot to develop specific LEED standards for industrial buildings, this product type is likely to experience less green building than other major product types.

b) Existing Buildings and Acquisitions

While new construction presents outstanding investment opportunities, the amount of space involved, even under the most optimistic assumptions, is miniscule relative to the stock of standing buildings. Major portfolio owners and managers are faced with two major challenges: what to do with the existing inventory, dominated by non-green buildings, and what properties to acquire in the future.

With rising energy prices, managers have long been incentivized to explore all feasible options for enhancing energy efficiency. The fact that average utility bills have not kept pace with recent rises in energy prices shows that managers have had some success in this regard. However, the recent surge in energy prices raises the stakes anew, providing fresh incentives for managers to continue the drive to greater energy efficiency. Even when landlords can pass along utility costs to tenants, they still must be vigilant about restraining cost increases. Tenants (and their representatives) are increasingly sophisticated about looking beyond face rents to consider the total cost of occupancy. In the long term, buildings with excessive utility charges will command lower net market rents, all else being equal.

The main challenge for major investment managers will be working with clients to develop realistic expectations with respect to payback periods and return parameters. The financial calculus for energy retrofits should be straightforward. Theoretically, energy savings from retrofits are capitalized into resale value, so the payback should be transparent to the length of the hold – assuming future energy savings can be documented.

Going the next step to LEED status is a more complex decision, if based solely on long-term investment value. First, the market premium for renovated green buildings is still not clear. Second, many of the points required for certification are more easily attained when the building is empty, especially for older buildings. If a building has tenants in place, the renovation costs can pale in comparison to the value of income lost during renovations and the costs incurred to re-lease the space, even if at a higher rent. Tenant lease restrictions may also limit an owner's ability to relocate tenants to undertake the renovations.^{***}

But as tenant demand for green buildings outpaces the market's ability to supply new product, many existing buildings *will* be able to successfully tap into the green market through retrofits or renovation. Especially attractive will be older, Class B structures with good "bones" located in superior locations that can be repositioned to Class A status after renovation.

Portfolio owners also will need to consider when to part with older, energy-inefficient properties whose renovation would be cost-prohibitive. At present, there is not enough green product available to force discounts for non-green buildings, but that will likely change once there is sufficient critical mass of green buildings.

The challenge for acquiring new assets is even greater. With the scarcity of green product available for purchase, no investor of any size can adopt a green-only policy focused on acquisitions. This is why green building funds tend to be small and generally focused on new construction. Rather, investors seeking a green strategy, aside from upgrading their own portfolio and building new product, will need to acquire existing product with an eye toward upgrading to green (or at least energy-efficient) standards. This strategy complicates the due diligence process, as investors will need to evaluate buildings for their energy efficiency and potential for upgrades, which may be difficult and imprecise, given the time and resource constraints of due diligence efforts.

c) Corporate Policies

Beyond the asset-specific opportunities to develop, acquire, or renovate green product, developers and investors can capitalize on the same goodwill benefits driving corporate owner-users and major tenant groups. Many leading developers have committed to green-only construction including Hines Interests, the Durst Organization, Vulcan Real Estate and Gerding Edlen Development. Others have established dedicated green building divisions or otherwise made strong commitments to green building, such as the Opus Corporation, Beacon Capital Partners, Forest City Enterprises and Wilson Meany Sullivan.

Professional service firms have been even more visible in the green building movement. Architectural firms such as William McDonough + Partners, Gensler and HOK have long championed sustainability in their practices. Now full-service real estate firms have staked out green leadership positions including Jones Lang LaSalle, which recently was named an Energy Star Partner of the Year for its energy management business, and CB Richard Ellis, which has

^{***} For these reasons, LEED's renovation program is often more suitable for corporate owners than for investors. The corporate share of the LEED-EB program (for renovations) at 52% is twice its 26% share of LEED-NC and LEED-CS (for new construction). By contrast, developers and investors have only 12% of the LEED-EB buildings, compared to 21% of the LEED-NC and LEED-CS

committed to becoming carbon neutral within three years, offsetting any greenhouse gases it causes to be released into the atmosphere with compensating reductions.

Again, it is the institutional investment community that continues to lag behind the rest of the industry. Beyond the pension funds and relatively small RPI funds mentioned previously, and despite the significant and growing green investment opportunities, few major investors or investment managers have announced clear green-only or even green-centric investment policies.^{***} Perhaps these policies will change with the greater amount of green building product available for acquisition.

One irony is that many of these entities already have undertaken many of the policies endorsed by the green building movement, such as retrofitting existing buildings for greater energy efficiency and focusing acquisition and development activity on urban infill sites. Without an explicit green policy, however, the firms may not reap all of the potential market benefits from their green actions.

d) Green Funds and REITs

The \$2 billion or so in green funds noted previously is trivial compared to the amount already invested in green buildings, and the amount that will be required to finance development and renovation of future green product. Thus, specialized green funds and green REITs are likely to play ever-larger roles in financing new green buildings, providing greater capital funding for this product and an attractive investment vehicle for socially-conscious investors.

Risks, Challenges and Other Considerations

Any move into a new product or market brings its share of risks along with the rewards. The main risks associated with moving into the green building arena are the inevitable **missteps** that less experienced and knowledgeable players will make in attempting to enter this market: underestimated construction costs, product that misses the mark, inability to deliver on promises. The challenge will be to **gain experience** with the product and market, and being able to **forge the relationships** with providers to deliver and manage the product. In addition to financial investments, firms will need to acquire staff with specialized skills, most likely through a combination of strategic hires, training, and project experience.

In the case of green building, however, the risks of not moving quickly enough almost certainly will outweigh the risks of moving too quickly. Or, as captured in the name of a recent industry symposium, the greatest danger for real estate investors are “The Risks of *Not* Going Green.” The momentum toward greener practices and assumptions is growing throughout the real estate industry, and suggests that 2007 will mark a milestone in wide-scale industry adoption. Major tenant groups, developers, public agencies, and service providers all seem to have jumped into the deep end of the green building pool; only major investors or investment managers seem to be wading in much shallower waters, if not waiting by the side.

Thus, the key risk to not taking the plunge is **product obsolescence**. Tenant demand for greener facilities is blossoming and spreading from offices, classrooms, and laboratories to stores, health-care facilities and apartments. At present there is not enough green product to satisfy potential demand, likely yielding operating premiums for the limited supply that is available. But that equation will flip once the supply reaches a critical mass and establishes a new norm for institutional-quality real estate.

^{***} One conspicuous example is Kennedy Associates, registered real estate investment advisor focused on Taft-Hartley retirement (union) funds, which has fully endorsed the principles of green building and RPI.

But when will brown buildings begin to suffer market discounts relative to greener buildings? While the pace cannot be known with certainty, of course, it could easily emerge within the traditional ten-year institutional hold period. When advances in HVAC and other construction technologies following WWII allowed building windows to be permanently sealed, building designs changed radically and the definition of premier office buildings was reconceived almost overnight. By the mid 1960s, no top-quality offices were being built with operable windows – until recent green building designs turned that assumption on its head.

The shift to green buildings is no less radical, and can be reasonably expected to move even more quickly given the much greater volume of capital flowing through real estate now compared with two generations ago. The coming change in building codes through ASHRAE's Standard 189P, combined with the growing number of cities requiring LEED standards, will ensure that *all* new buildings eventually will be greener. Another related risk: the wealth of incentives that governments and utilities now provide for going green will be increasingly replaced by mandates and penalties for those that do not.

Of course, the flight to green buildings will not come to all markets simultaneously, but the move is already taking hold in many markets. In downtown San Francisco, at least five major green office projects are under construction or in advanced planning stages, all sponsored by private developers, with more than 2.1 million square feet of space among them, including buildings by Beacon Capital Partners, Tishman Speyer, TMG Partners with RREEF and Wilson Meany Sullivan. All are seeking certification under USGBC's LEED-CS program, most at the Gold level. Three other major projects in earlier planning stages are also known to be seeking LEED designations, which together would add another 1.4 million square feet of space, for a total of 3.5 million square feet of new green office product.^{***} With some 33 million square feet of Class A office inventory in the market now, these additions, virtually all of it speculative space, would represent a 10% net addition, certainly enough to change the dynamic of what is considered the superior office space in the market. Other cities are seeing comparable pipelines of green projects.

Will every green building need to be certified as LEED? Certainly not. Not every tenant will need, appreciate, or be able to afford the new product. But as more and more tenants declare green-only facility policies, older, less-green product will become increasingly less desirable, particularly as the supply of green product available for lease grows. The result will be lower rents and higher vacancies for the buildings that do not renovate to green standards.

A related risk, bordering on the certainty, is that less energy-efficient buildings will face **leasing challenges** due to elevated energy prices. Tenants increasingly consider the total cost of occupancy, including utility charges, and landlords with high utility charges will have to absorb some of those expenses, by either capping utility charges or setting rents proportionately lower. In either case, operating income suffers. The possibility of some sort of carbon tax or cap-and-trade program will only compound the problem for owners of less efficient buildings.

Finally, investors and investment managers with fiduciary responsibilities will be especially challenged to develop sensible and coherent policies to take advantage of green opportunities while avoiding unnecessary risks associated with continuing to hold less-green properties. The difficulties are magnified for investors that control large real estate portfolios – whether through direct property investments, lending, or securities – particularly until the supply of green product expands.

^{***} These figures do not include the new federal building (571,000 square feet), just completed under the LEED-NC at the Silver level, nor several high-rise residential projects seeking LEED status.

Summary and Final Thoughts

Green building is fundamentally altering real estate market dynamics. The trends are already clear: tenants are demanding greener, more energy-efficient facilities; and governments are strongly encouraging the move to greener buildings through financial and planning incentives, as well as increasingly strong mandates. Soon building codes will be revamped for the first time in a generation, requiring energy efficiency 30%+ greater than current standards. And soon federal and local governments may enact legislation to reduce greenhouse gas emissions, possibly targeting inefficient buildings with taxes or other costs. Moreover, greater concern about climate change is fueling a growing responsible investment movement.

The upshot will be a redefinition of what constitutes “institutional-quality” real estate. Unlike other recent technological innovations in building materials and systems, the greater tangibility of today’s sustainable design features are driving tenant appeals for greener buildings. The prospect of ensuring high energy prices will only accelerate the shifts. Although green building financial performance data is still skimpy, the best evidence paints a compelling investment picture: green buildings can cost little more to build than conventional buildings but yield substantial operating cost savings and other concrete benefits for tenants, which seem to translate into higher rents, lower vacancies, and quicker absorption. Rising investor interest for green product will inevitably drive down cap rates. Add in the subsidies available to greener buildings – and penalties for less efficient buildings – and a favorable return profile relative to conventional buildings seems probable, if not definitive.

However, institutional investors are still in the early stages of grasping the scope and pace of changes facing the real estate industry. The risks to companies ignoring or minimizing the challenges presented by climate change were best characterized in a recent paper by Lehman Brothers, which concludes:

“Global warming . . . is likely to prove one of those tectonic forces that – like globalization or the aging of populations – gradually but powerfully changes the economic landscape in which [businesses] operate, and one that causes periodic sharp movements in asset prices . . . Firms that recognize the challenge early, and respond imaginatively and constructively, will create opportunities for themselves and thereby prosper. Others, slower to realize what is going on or electing to ignore it, will likely do markedly less well.”
44 “

In real estate, property owners will need to adapt quickly – or risk the consequences of sharply shrinking demand for property that, over time, becomes increasingly obsolete. However, as with any major jolt in the economic landscape, a multitude of opportunities also is opened for the enlightened firms that recognize and can adapt to the new realities.

Investors and investment managers with fiduciary responsibilities will be especially pressed to develop sensible policies that leverage green opportunities while avoiding unnecessary risks associated with continuing to hold less-green properties. The difficulties are magnified for investors that control large real estate portfolios, particularly until the supply of green product expands to a more equilibrium level.

Alex Symes contributed research assistance for this paper.

Appendix A: Overview of the LEED Program

The USGBC is a consortium of government agencies, non-profit organizations, product manufacturers, and professional service firms devoted to encouraging green building development and renovations. Its core mission is to “transform the way buildings and communities are designed, built and operated, enabling an environmentally and socially responsible, healthy, and prosperous environment that improves the quality of life.”

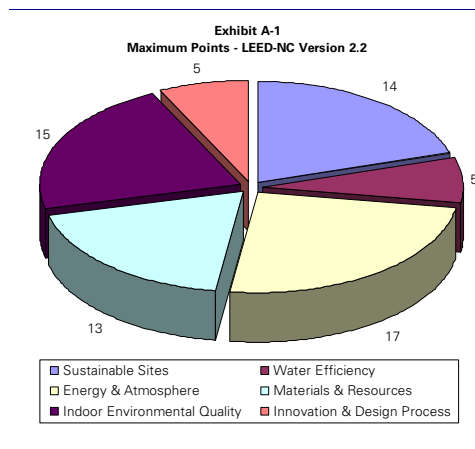
The organization’s primary activity is developing standards for sustainable development and certifying the extent to which individual buildings (or soon, groups of buildings) satisfy those standards. In addition to providing education and advocacy on green building issues, the USGBC also offers a professional accreditation program, with over 40,000 professionals now certified in various trades and industries including design, construction, manufacturers of building materials and systems, consultants and other service providers.

LEED standards are developed through a process of collaboration and testing prior to their issuance, starting with a proposed set of standards, pilot testing, industry comment and finally adoption. As summarized in the table below, the initial LEED standards were intended to cover a broad spectrum of building types, while more recent standards have been developed for specialized building types and situations. Currently there are nine LEED programs already adopted or under development.

Standard	Year Adopted/Drafted	Most Applicable Development Type
New Construction (NC)	2000	Build-to-suit or owner-occupied
Existing Buildings (EB)	2004	Renovation or reposition
Commercial Interiors (CI)	2004	Tenant improvements
Core and Shell (CS)	2006	Speculative development
Homes (H)	Fall 2007 (expected)	Individual homes
Neighborhood Development (ND)	Early pilot (v1 – 2007)	Planned developments
Retail - New Construction	Late pilot (v 2 - 2007)	Shopping centers and retail spaces
Retail - Commercial Interiors	Early pilot (v1 - 2007)	Retail interiors
Schools	2007	K-12 schools

In addition, LEED systems are being developed for campuses, labs and health-care facilities. Finally, the USGBC offers application guides for special situations, such as the guide for Multiple Buildings and On-Campus Projects, which helps users apply the general New Construction standards to multi-building settings, such as corporate campuses, colleges and government installations

The basic structure of every LEED certification involves achieving a minimum number of LEED points. The credits are grouped along categories appropriate to each certification type. For example, the New Construction program has six categories including Sustainable Sites, Energy and Atmosphere, and Indoor Environmental Quality. Each category has prerequisites (usually between one and three) that must be met to score any LEED credits in that category. Each credit has a point value (typically one point per credit) that adds up to a final score for the project. Depending on the final score, a LEED project is awarded one of four possible levels of certification: Certified (lowest), Silver, Gold, and Platinum (Highest). Shown in Exhibit A-1 are the maximum number of points that can be awarded for each category under the LEED-NC program. The category with the greatest number of possible points is energy.



The LEED system has met strong objections from various quarters. Many bemoan the cost and difficulty of securing LEED certifications. While application fees are relatively nominal, particularly in the context of overall project costs, compiling the information required for the application can impose extraordinary burdens on applicants, such as hiring specialized LEED consultants. Firms can spend over \$100,000 just to obtain a LEED certification. This expense may be justified for larger projects, but viewed as unreasonable for smaller projects.

More substantively, the main criticism concerns the equal weighting for each LEED credit, despite huge differences in cost and environmental benefit. One extreme example: a bicycle rack costing a few hundred dollars can earn almost as much credit as a sophisticated HVAC system costing tens of thousands of dollars. Another objection is the focus on *inputs* (building design) rather than on *outcomes* (actual performance). LEED buildings typically are certified before occupancy – and thus before demonstrating many of the claimed operational benefits. Finally, LEED uses a uniform set of standards across the country, which fails to account for regional climactic differences. Aside from basic issues of fairness and integrity, this homogeneous approach encourages applicants to “game” the system, incorporating the least-cost green features, regardless of their suitability for the particular region or climate.⁴⁵

The USGBC has addressed some of these issues in revised program specifications. Improvements include a streamlined certification process and integration of life-cycle costing into new LEED rating systems. The USGBC also is encouraging development of new, more focused standards targeting specific land uses for situations such as retail and homes.

A more fundamental objection to LEED is its inherent bias toward new construction rather than renovation. A common environmental refrain is that “the greenest building is the one you don’t build.” The LEED-EB program, which does address the vast standing stock of non-green buildings, was not approved until four years after the new construction program, and accounts for less than one in eleven LEED projects.

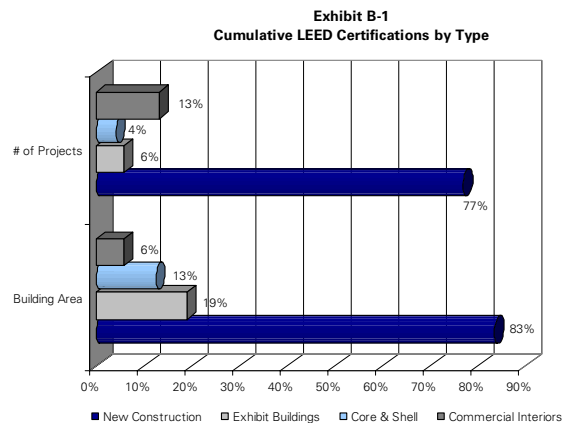
Nonetheless, in a growing country, the building stock must continuously expand to meet the needs of the expanding base of households and firms and to replace dilapidated buildings and underutilized parcels, so new construction is inevitable. Thus, while environmentalists may not encourage new development *per se*, most can endorse the proposition that if new construction is inevitable, it might as well be green. However, the initial USGBC program for new construction (LEED-NC) effectively excluded investment real estate, as many of the points required for certification under LEED-NC are controlled by tenants, who typically are largely unknown when a speculative project is being developed; in any case the owner can exert only so much control over tenant improvements before deterring tenants from leasing in the building. The new LEED-CS program addresses this shortcoming by orienting the rating system toward the building components over which private developers have the greatest control: the project site and the core and shell of the building.

Appendix B: LEED Program Activity

In addition to the sheer volume of green building, close analysis of this activity reveals several other key trends:

Project Types

The vast majority of LEED projects have been certified under the New Construction (LEED-NC) program, with more than three fourths of all projects and two thirds (69%) of the building area to date (Exhibit B-1). Next most popular has been the Existing Buildings (LEED-EB) program for renovations, which has accounted for 16% of building area to date. But recently the new Core and Shell (LEED-CS) program aimed at speculative development has jumped to second place with 14% of the green building area built in over the past two years, compared to 12% for LEED-EB. The Commercial Interiors (LEED-CI) program, with smaller average project sizes, accounted for 13% of projects completed to date but only 5% of building area.

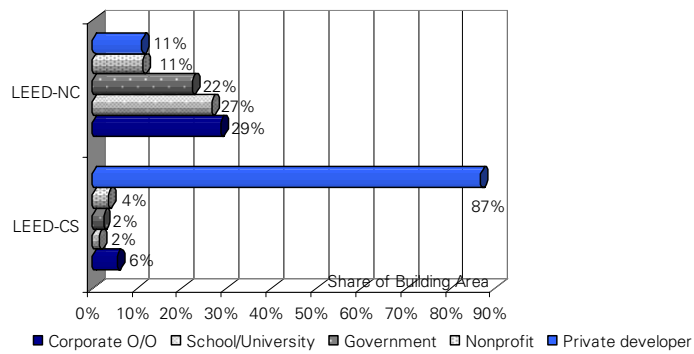


Sources: USGBC and RREEF

Composition of Developers and Tenants

The grading system for LEED-NC is oriented toward government and corporate owner-users, as speculative developers generally cannot earn the points for tenant spaces needed for certification. On the other hand, the newer programs for LEED-CI and especially LEED-CS are more accommodating of non-occupying building owners and speculative developers. These biases are reflected in the composition of owners participating in the various LEED programs. Corporate owner/users, schools and universities, and government agencies each account for about one quarter of the building area certified under the New Construction program; non-occupying developers have delivered only 10% (Exhibit B-2). By contrast, developers account for almost 90% of the space certified under the new Core and Shell program, while corporate and nonprofit users are responsible for most of the rest.

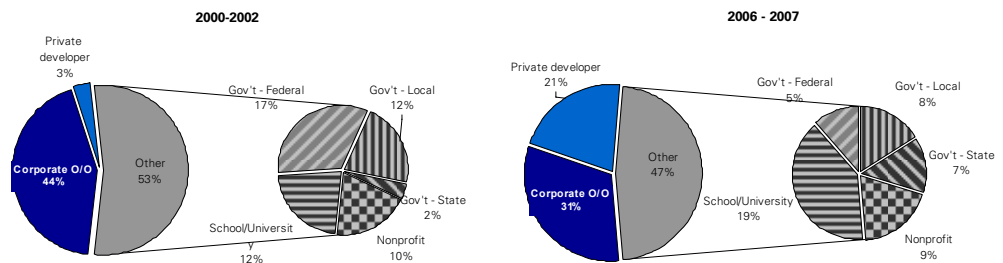
Exhibit B-2
Share of LEED-NC vs. LEED-CS



Sources: USGBC and RREEF Research

As a result of the original LEED-NC emphasis, initial participation in LEED was represented largely by government agencies and large corporate owner/users, but the pendulum has started to swing more to developers and lessee tenants with the addition of the LEED-CS program. In the first three years of the LEED program (2000-02), over half (53%) of the space certified by USGBC was owned by either government agencies or nonprofits. Corporate users delivered nearly half (44%) and developers/investors barely 3% of the building area (Exhibit B-3). During 2006 and early 2007, however, the developer share jumped to 21%, while corporate owners declined by one third and government dropped from 31% to under 20%.

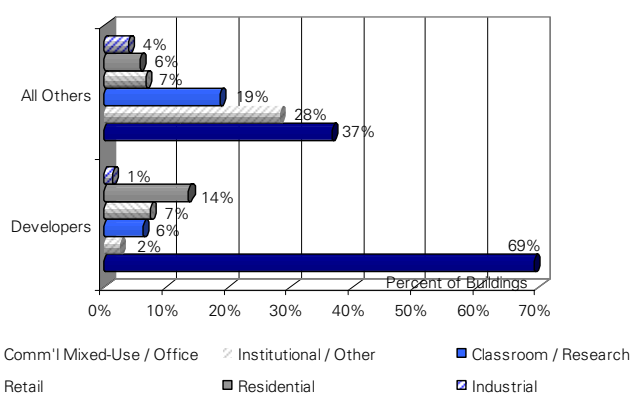
Exhibit B-3
Share of LEED-Certified Building Area
By Type of Owner



Sources: USGBC and RREEF Research

The increasing presence of private developers among green builders is changing the types of projects being constructed. Private developers focus first and foremost on office buildings, which account for over two thirds of the privately-developed green projects, followed far behind by residential. Excluding private developers, office buildings are still the top product type, showing the influence of corporate users, but offices register only a third of all projects; institutional projects (civic buildings, places of assembly, transit projects, etc.) are second-most common, followed by classrooms and research facilities, reflecting the strong participation by schools and universities (Exhibit B-4).

Exhibit B-4
LEED Building Type by Ownership Class



Sources: USGBC and RREEF Research

The changing ownership patterns are bringing change to the types of tenants in green buildings as well. In the initial years of LEED, corporate owner-users and government each accounted for about 40% of the green building space, followed by schools and universities with about one tenth of the total, and nonprofits with half of that.^{§§§} The composition in more recent buildings is dramatically different, with private users down to about one third of the total and governments down to one fifth. On the other hand, schools and universities almost doubled their share, while multi-tenant buildings have surged from only 1% to almost 14% of space (Exhibit B-5).

Exhibit B-5
Tenants Composition in LEED-Certified Buildings
By Year of Certification

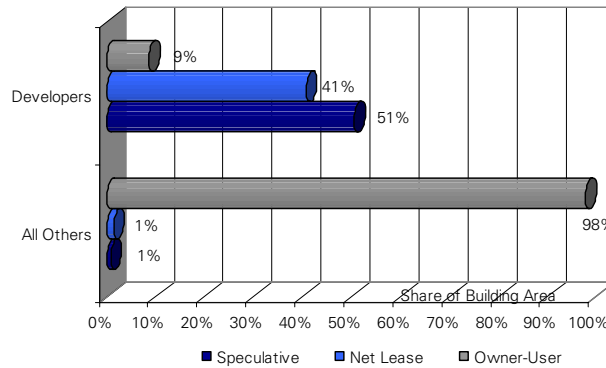
	2000-2003	2006-07	Percentage Point Change
Private owner/user	42.1%	35.1%	(7.0%)
Government	40.7%	20.9%	(19.8%)
School/University	11.1%	18.9%	+7.9%
Multi-tenant	1.0%	13.8%	+12.8%
Nonprofit	5.1%	7.2%	+2.1%
Residents	0.0%	4.0%	+4.0%
	100.0%	100.0%	+0.0%

Sources: USGBC and RREEF Research

Finally, the greater developer participation is also changing tenancy in green buildings. Essentially all projects delivered by other types of owners – corporations, government agencies, nonprofits, and schools/universities – are owner-occupied (Exhibit B-6). By contrast, fully half of all LEED-certified buildings produced by developers are speculative, multi-tenant buildings, thereby allowing smaller, less-capitalized tenants into green buildings; the remainder is either net leased to single tenants (~40%) or is considered owner-occupied, such as resort facilities (~10%).

^{§§§} In this comparison, "private owner-users" refers to buildings that are 100% occupied by a single corporate tenant, through either a net lease or outright ownership. Corporations or government agencies leasing space in typical multi-tenant office rental buildings are classified under "multi-tenant."

Exhibit B-6
LEED Buildings by Type of Tenancy

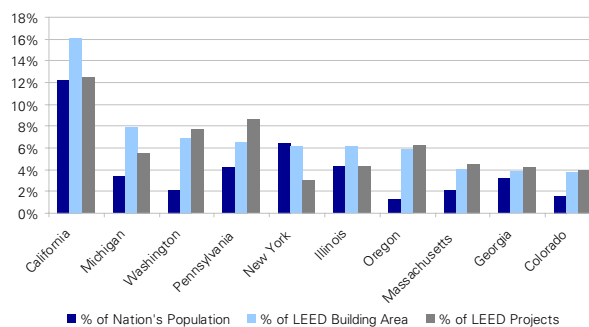


Sources: USGBC and RREEF Research

Regional Patterns

Although LEED-certified buildings can be found in every state and almost 400 cities across the country as of mid-2007, green building activity is nonetheless highly concentrated in certain states and cities. In general, these buildings are located in larger states with politically liberal voters. With the exception of Georgia, every other state in the LEED top 10 would be considered a “blue” state (tending to vote Democratic) and nine of the top 10 have a population of at least five million residents (excepting Oregon with 3.7 million). But the top states are dispersed across the country, with four in the West, three in the Northwest, two in the Midwest and one in the Southeast; only the Southwest is not represented, though Texas ranks in the top 15 (Exhibit B-7).

Exhibit B-7
Top Green Building States

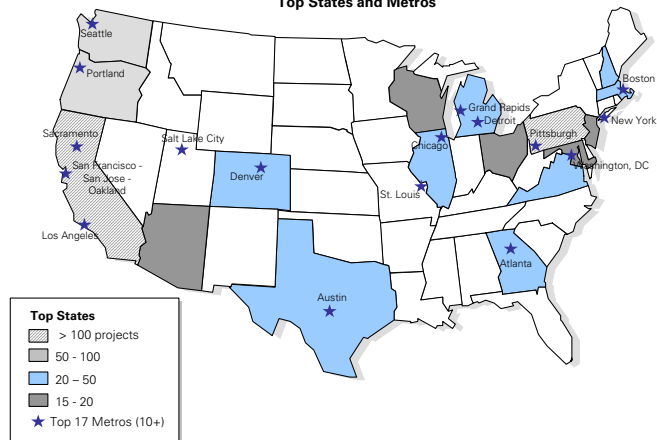


Sources: USGBC and RREEF Research

Together these top 10 states have fully two thirds (67%) of the LEED building area, despite having barely 40% of the nation's population. Extending the list to the top 15 states brings the LEED share to about 80% of the LEED building area, compared to less than 60% of the nation's population.

Drilling down to the metro level, LEED buildings tend to be highly concentrated in larger areas, such as New York, Atlanta, and Los Angeles, but capital cities (or other areas with significant government operations) also rank highly, reflecting the predominance of government facilities among LEED buildings (Exhibit B-8). Ironically, several of the greenest metros have relatively moderate climates (San Francisco, Portland, Seattle, San Diego), and thus do not benefit financially as much as cities in warmer or colder climates because the amount of potential energy savings is lower.

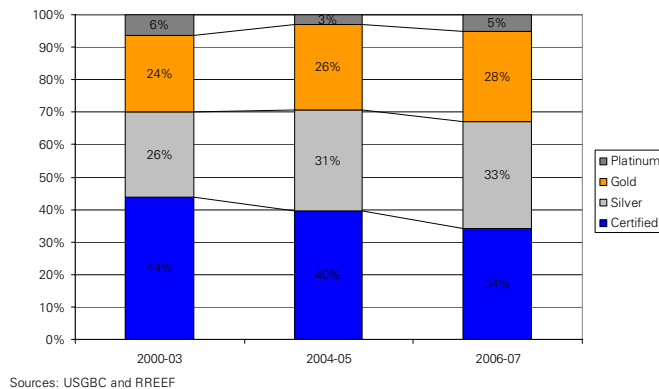
Exhibit B-8
LEED-Certified Buildings
Top States and Metros



Certification Level

A final green building trend is the movement to higher levels of green building certifications. The greatest share of projects is certified at the lowest level – but just barely (Exhibit B-9). Projects certified at this basic level have decreased steadily as a share of all LEED projects, from 44% of projects during the first four years of the program to only 34% more recently. On the other hand, projects at the silver and gold levels have risen to 33% and 28%, respectively.

Exhibit B-9
LEED Certification Level Over Time



The main reason for the rising share of premium designations: developers are gaining greater experience with green product and a better understanding of how to score LEED points. These trends also show the impact of the more investor-owned buildings in the program. Many early green buildings were developed by government agencies and non-profits with limited construction budgets; newer projects intended for the investor market are frequently more expensive, higher-quality projects for which more costly green features can be better justified financially. Further encouraging the push to higher LEED levels are the various local government incentive programs that only kick in at the gold level.

Endnotes

¹ Analysis prepared by the Social Investment Research Analyst Network (SIRAN) and KLD Research and Analytics, Inc., as reported on the SIRAN website, April 25, 2007. Significantly, only one real estate firm, Pro-Logis, is believed to be counted among the 49.

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³ "The Asset Manager's Guide to Investing in Climate Change," Mark Fulton et al, Deutsche Bank Asset Management, October 2007.

⁴ "About Real Estate," Torto Wheaton Research, April 20, 2007.

⁵ "Oil and Natural Gas Industry Guidelines for Greenhouse Gas Reduction Projects," March 2007.

⁶ EEI press release: "EEI Global Climate Change Principles," February 8, 2007.

⁷ "Protect God's Creation: Vatican issues new green message for world's Catholics," *The Guardian*, April 27, 2007.

⁸ An Introduction to the U.S. Green Building Council and the LEED Green Building Rating System, PowerPoint presentation by the U.S. Green Building Council, October 2005.

⁹ Energy Information Administration, U.S. Department of Energy Office of Integrated Analysis & Forecasting, May 2007.

¹⁰ "Global Mapping of Greenhouse Gas Abatement Opportunities up to 2030," Vattenfall AB, January 2007.

¹¹ "Reinforcing Community Sustainability: Todd W. Mansfield is New Chairman of the Urban Land Institute," press release from ULI, July 9, 2007.

¹² "Report of the World Commission on Environment and Development," United Nations, 1987.

¹³ "The Federal Commitment to Green Building: Experiences and Expectations," United States Office of Federal Environmental Executive, 18 September 2003.

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¹⁵ Britain's Building Research Establishment (BRE) counts over 65,000 buildings certified under its BREEAM program to date in the U.K. alone, compared to fewer than 900 LEED-certified buildings. Similarly, BRE claims some 270,000 buildings have registered under BREEAM, compared to 8,000 in the LEED program.

¹⁶ Active GBCs have been established in Australia, Japan, Taiwan, India, Emirates, Mexico, the United Kingdom, and New Zealand, in addition to the United States.

¹⁷ U.S. office construction figures are based on data from Torto-Wheaton, while green building construction is based on USGBC data. The Torto-Wheaton tracks "net completion" while the USGBC data includes all LEED-NC, LEED-EB, and LEED-CS (and excludes LEED-CI) projects RREEF Research classified as either office or commercial mixed-use.

¹⁸ "New Survey Finds Tenants Willing to Pay Premium for Green Space," CoStar Green Report, May 16, 2007.

¹⁹ "Americans Report Increased Environmental Consciousness and Expectation that Companies will take Action," 2007 Cone Consumer Environmental Survey.

²⁰ A.T. Kearney and Institute for Supply Management (ISM) Sustainability Management Survey, January 2007.

²¹ "Survey shows businesses fighting energy costs with increased efficiency" Facilities Management News, June 22, 2007.

²² "The Costs and Financial Benefits of Green Buildings – A Report to California's Sustainable Building Task Force," Principal Author: Greg Kats, Capital E, October 2003.

²³ "Towards a Green Investment Fund - Opportunities & Issues," Compass Resource Management, February 2007.

²⁴ "It Pays to Be Green," Bennett Voyles, National Real Estate Investor, July 1, 2005.

²⁵ See, for example: Quantifying the Business Benefits of Sustainable Buildings – Summary of existing research findings," Alan Yates, Centre for Sustainable Construction, BRE, February 2001 and "Greening The Building And The Bottom Line: Increasing Productivity Through Energy-Efficient Design," Joseph J. Romm, U.S. Department Of Energy and William D. Browning, Rocky Mountain Institute, 1998.

²⁶ Greg Kats, Capital E, October 2003, *op. cit.*

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- ²⁷ "Majority of Retailers Taking Sustainability to Heart, Survey Finds," GreenBiz.com, October 2, 2007.
- ²⁸ Executive Order 13423: "Strengthening Federal Environmental, Energy, and Transportation Management," January 24, 2007.
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- ³⁰ *Progressive Investor*, May/June 2007.
- ³¹ See, for example, "Global Survey Shows 'Green' Construction Costs Dramatically Lower than Believed," press release from the World Business Council on Sustainable Development, August 21, 2007, and "Market Barometer – 2005 Survey of Green Building," Turner Construction, 2005.
- ³² Greg Kats, Capital E, October 2003, *op. cit.*
- ³³ A somewhat larger-scale study by the global construction cost firm of Davis Langdon in 2004 reached similar results. Comparing 45 LEED-registered public facilities with 93 non-LEED buildings, the study found little to no cost premium, but acknowledged that significant differences among the projects makes definitive "one size fits all" conclusions elusive. Nonetheless, a 2007 update of this study by the same team confirmed the original study conclusions. "Costing Green: A Comprehensive Cost Database and Budgeting Methodology," Lisa Fay Mathiessan and Peter Morris, Davis Langdon, July 2004.
- ³⁴ Cited in Turner Construction, 2005, *op. cit.*
- ³⁵ Cited in "Energy Management & Investor Returns - The Real Estate Sector," Innovest Strategic Value Advisors, October 2002.
- ³⁶ Cited in "Responsible Property Investing," Gary Pivo and Paul McNamara, *International Real Estate Review*, Volume 8, Number 1, 2005.
- ³⁷ McGraw-Hill 2006 SmartMarket Report.
- ³⁸ Compass Resource Management, February 2007, *op. cit.*
- ³⁹ Innovest Strategic Value Advisors, October 2002, *op. cit.*
- ⁴⁰ See, for example: Alan Yates, BRE, February 2001 and Greg Kats, Capital E, October 2003, *op. cit.*
- ⁴¹ "Is There a Future for Socially Responsible Property Investments," Gary Pivo, *Real Estate Issues*, Fall 2005.
- ⁴² *Dodge Construction Potential Bulletin*, McGraw-Hill Company, Inc., monthly reports 2001 to 2006. This figure includes both private- and public-sector development.
- ⁴³ Cited in "A Green Outlook: Changes Affecting the Business Community," CBRE/Torto-Wheaton Research, Volume 6, Number 3, May 21, 2007.
- ⁴⁴ "The Business of Climate Change: Challenges and Opportunities," John Llewellyn et al, Lehman Brothers, February 2007.
- ⁴⁵ See, for example, "LEED is Broken ...Let's Fix It," Auden Schendler and Randy Udall, 2005.

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