

Eric Prouty
1.617.371.3729
eprouty@canaccordgenuity.com

Eric Glover, CFA
1.415.229.0669
eglover@canaccordgenuity.com

Sustainability

The Green Building boom continues

Profiting from the Green Building movement

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- Our research leads us to conclude that we are in the early stages of what will be one of the most significant secular trends in the global building/construction market – the “Green Building” (GB) movement.
- While green building historically has represented little more than an interesting niche market driven by forward-thinking architects and builders, accelerated demand and attractive tangible returns have opened up the mainstream building industry to GB practices, in our view.
- Currently, the overall green building market in the US is estimated to be approximately \$36 billion to \$49 billion, representing about 10%-12% of total construction dollars spent annually.
- Market demand for greater energy efficiency, the introduction of new green building codes, various legislative initiatives, and steadily declining costs of many GB technologies are expected to drive GB's market share to more than 20% by 2013, in our view. Over time, we conclude GB practices will become the norm within the construction industry.
- In this report, we present an overview of the green building industry, examining the economic and environmental benefits as well as discussing several of the industry's long-term growth drivers. We also examine the burgeoning market for green retrofits, a particularly timely topic given the current slowdown in the nonresidential construction industry.



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INTRODUCTION AND INVESTMENT THESIS

“Green Building” (GB) is a term which, in only a couple of years, has moved from obscurity to the front pages. The Environmental Protection Agency describes a green building as one that reduces its “direct and indirect impact on the environment throughout its life – from the time construction begins, during occupancy, and eventually, when it’s decommissioned.” The United States Green Building Council’s (USGBC) mission statement is as follows: “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.”

While specific definitions can be debated, our research leads us to conclude that we are in the early stages of what is poised to be one of the most significant secular trends in the global building/construction market – the Green Building movement. While GB historically has represented little more than an interesting niche market driven by forward-thinking architects and builders, the mainstream building industry is opening up to GB practices given accelerated demand and attractive tangible returns, in our view.

Currently the overall green building market in the US is estimated to be approximately \$36 billion to \$49 billion, representing about 10%-12% of total construction dollars spent annually, according to McGraw-Hill. We conclude that multiple factors are driving the GB market, including:

- **The proliferation of green building standards** has contributed to the growth of the industry by providing specific guidelines and support for constructing green buildings. The USGBC’s Leadership in Energy and Environmental Design (LEED) certification program is a consensus-based, third-party rating system that has taken hold in the United States and abroad, and has helped standardize and encourage sustainable building practices. In addition, the recent release of ASHRAE 189.1 standards and the International Green Construction Code are key milestones within the evolution of the GB market, in our view, as they are likely to eventually become widely accepted within the building industry.
- **The economic benefits of green and energy-efficient buildings are compelling,** encouraging a steady market shift toward GB practices. Various research studies have concluded that green and energy-efficient buildings can achieve higher market values, as well as higher rental rates and tenant occupancy levels, compared to their traditional non-green counterparts. In fact, the USGBC states that building sale prices for energy-efficient buildings are as much as 10% higher per square foot than conventional buildings.
- **Legislative mandates/incentives and regulatory requirements** are among the main reasons that firms integrate sustainable practices. Incentives such as accelerated permits, tax credits, and rebates on green technology make building green an attractive and cost effective choice. As GB technologies have become more mainstream and widely used, costs have fallen significantly and are now comparable to legacy products in many cases.
- **Volatile energy prices** – With energy costs continuing to increase, companies and governmental organizations are increasingly concerned with becoming more energy-efficient.

- **Increasing global environmental concerns** have accelerated the industry's adoption of GB practices. While the focus has largely been pollution levels from the transportation and utility sectors, buildings are in fact significant consumers of energy and emitters of CO₂.
- **Energy-efficiency initiatives and green retrofit projects** often represent the simplest and most cost-effective ways to reduce a building's operating costs. Volatile energy prices, government mandates/incentives, and rising demand from building owners and tenants are the primary driving forces behind making existing buildings greener, according to our research.

While GB construction will still face the ups and downs of the broader construction cycle, the combination of these factors are expected to drive GB's market share to more than 20% by 2013, in our estimation. Longer term, we estimate that GB practices will become the norm within the construction industry.

THE GREEN BUILDING REVOLUTION

Although most people probably consider green building to be a relatively recent phenomenon, the concept dates back at least a century. According to Building Design & Construction (BD&C), skyscrapers and other buildings have long employed certain features that we would consider to be green today, such as passive ventilation systems to moderate indoor air temperature or deep-set windows to provide shade from the sun.

Generally speaking, the modern green building movement is considered to have been launched in earnest on Earth Day, April 21, 1993 when President Clinton announced plans to make the White House a "model for efficiency and waste reduction." Soon after that, several other federal green projects were undertaken, including at the US Department of Energy headquarters, the Pentagon, and three national parks.

In late 1998, the USGBC (US Green Building Council) adopted its first set of green building standards, known as LEED Version 1.0. While it certainly represented a milestone in the evolution of the green building industry, LEED 1.0 was refined to LEED 2.0 in March 2000. This is the set of standards that created the 69-point system for green building that was used until the introduction of LEED 2009 (with a 110-point system) last year. LEED 2009 continues to employ the now well-known rating categories: Certified, Silver, Gold, and Platinum.

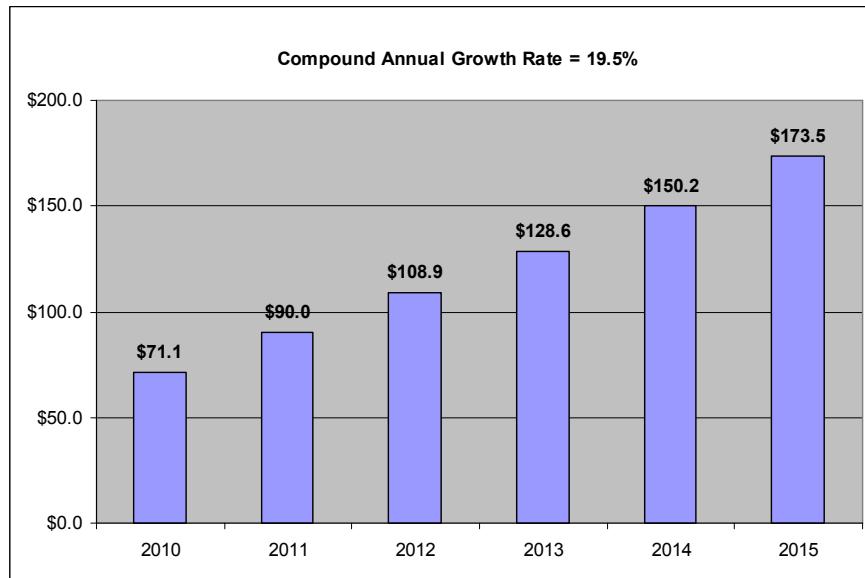
The term "green building" generally refers to a building that:

- Uses an integrated process in the design stage;
- Is carbon neutral or has low emissions when compared with a building of similar size and purpose;
- Is built from materials that are reused, recycled, or rapidly renewable;
- Has high indoor air quality free from chemicals and contaminants;
- Focuses on lowered and renewable energy use, particularly with regard to water conservation and in heating and cooling.

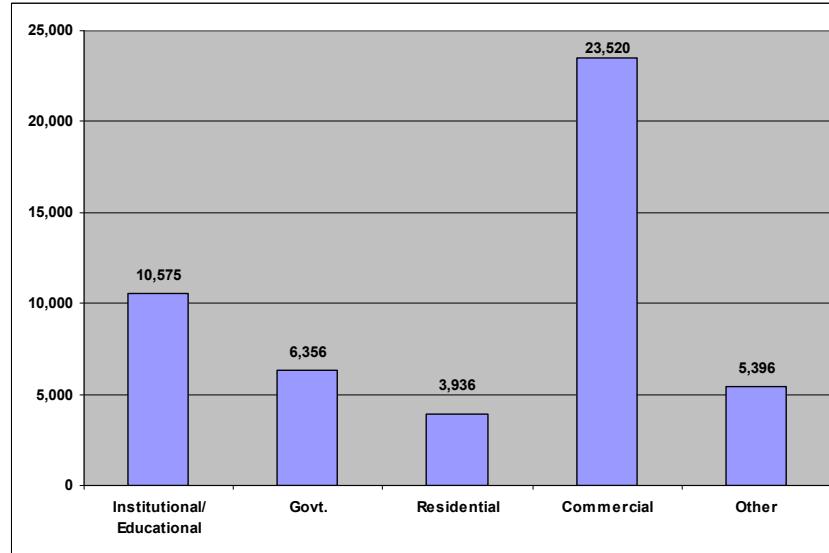
The green building movement takes off

"In less than a decade, the US Green Building Council has emerged as one of the most successful examples of nonprofit membership organization development in recent history. Its story could easily be a case study at Harvard Business School," according to an article in BD&C. Just consider the following forecasts:

- Green building represented <1% of nonresidential building starts in 2000. By 2004, it was up to 2% and by 2008 had jumped to 10%-12%. By 2013, the green market is estimated to climb to 20%-25% of nonresidential construction starts, according to McGraw-Hill.
- The overall (both nonresidential and residential) green building market in the US is estimated to be approximately \$36 billion to \$49 billion, representing about 10%-12% of total construction dollars spent annually, according to McGraw-Hill (MGH). By 2013, MGH estimates the green building market is likely to more than double to \$96 billion to \$140 billion.
- A study by EL Insights also examined the total US green building market. EL Insights pegged the market's total value at approximately \$70 billion in 2010, growing to \$173.5 billion by 2015. This represents a projected compound annual growth rate of 19.5%. The EL Insights study forecast that the commercial green building market would grow by 18.1% annually through 2015, expanding from \$35.6 billion today to \$81.8 billion by 2015.
- USGBC's membership has quadruped since 2000. Today, there are approximately 20,000 member organizations (up from roughly 11,000 just three years ago), including corporations, governmental agencies, nonprofits and others from throughout the industry, according to the USGBC. The growth in USGBC membership is a direct reflection of the expansion of the green building market.
- Siemens and McGraw-Hill released a report this year indicating that corporate building portfolios are becoming steadily greener. For example, 21% of the surveyed firms indicated that 60% or more of their buildings were green vs. 17% in 2005. By 2012, 42% of firms are expected to report that 60% or more of their building portfolios are green, according to the study.

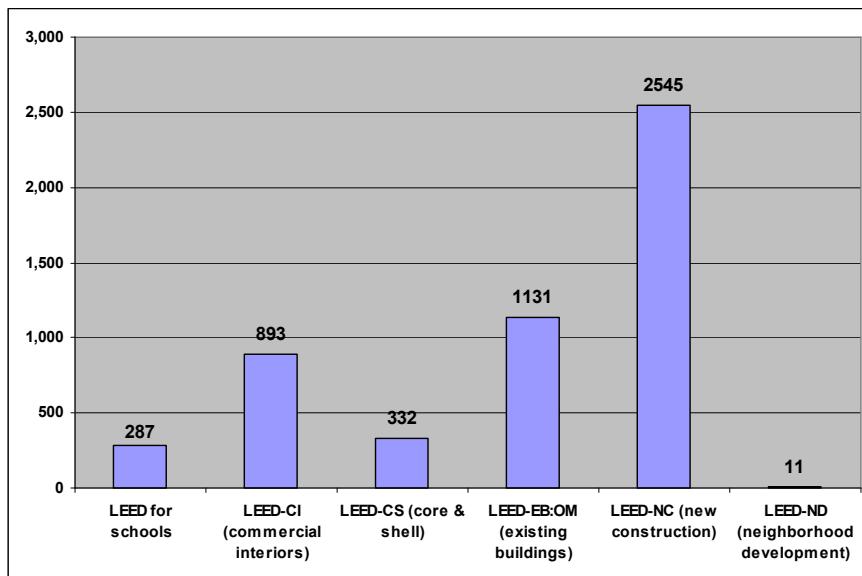
Figure 1: Projected US total green building market value (2010-2015E)

Source: EL Insights

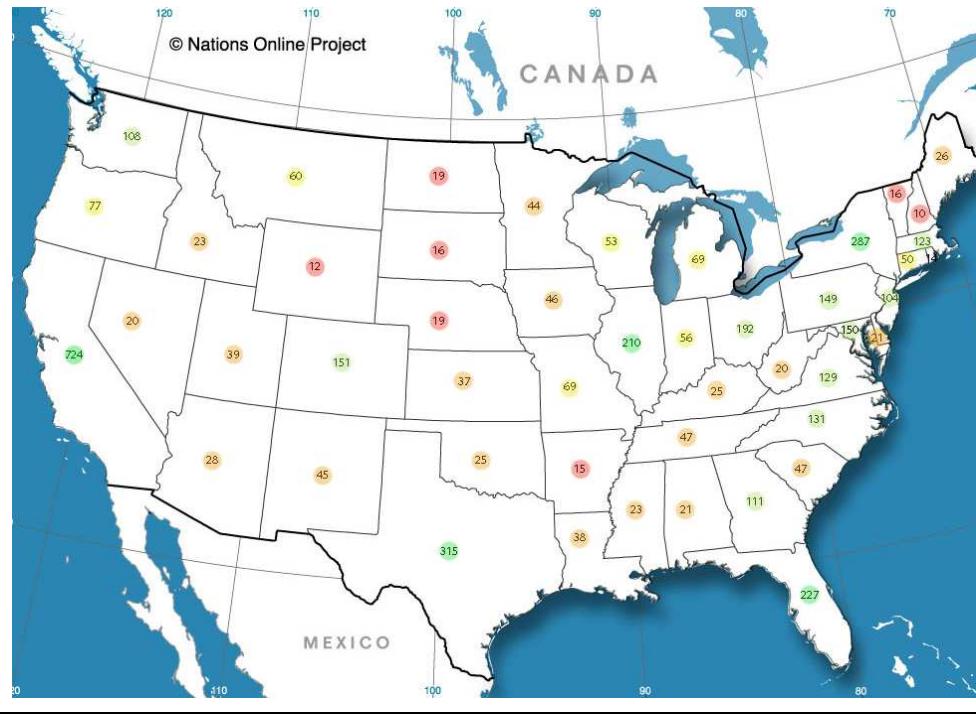
Figure 2: Planned LEED projects (2000-2010)

Source: USGBC (data as of June 1, 2010)

Looking at the mix of LEED projects by market sector, we see that commercial buildings are the single largest segment (47%). Other notable categories include institutional/educational (21% of the total), government (13%), “other” (11%), and residential (8%). We note that the federal government has been an early adopter of LEED, with federal departments such as the Department of Energy, Department of the Interior, Environmental Protection Agency, General Services Administration, and the military adopting LEED practices.

Figure 3: Registered LEED projects (2009-2010)

Source: USGBC (data as of June 1, 2010)

Figure 4: Completed LEED projects by state (pre-2009)

Source: USGBC

Figure 5: The EPA's Energy Star program is a popular alternative to LEED

Top 25 Cities With the Most ENERGY STAR Labeled Buildings in 2009

2009 Rank	Metro Area	Number of ENERGY STAR Labeled Buildings in 2009	Total Floorspace (million sq. ft.)	Cost Savings (millions)	Emissions Prevented (Equal to ___ homes' electricity use)	2008 Rank
1	Los Angeles, CA	293	76.0	\$93.9	34,800	1
2	Washington, DC	204	55.1	\$62.3	36,100	4
3	San Francisco, CA	173	51.6	\$69.4	24,700	2
4	Denver, CO	136	31.5	\$29.6	39,300	7
5	Chicago, IL	134	59.9	\$50.2	44,500	6
6	Houston, TX	133	64.0	\$73.9	53,400	3
7	Lakeland, FL	120	11.5	\$8.3	6,300	n/a
8	Dallas-Fort Worth, TX	113	33.1	\$33.7	25,600	5
9	Atlanta, GA	102	29.6	\$23.9	24,000	9
10	New York, NY	90	50.4	\$88.3	31,800	12
11	Minneapolis-St. Paul, MN	89	34.5	\$36.4	45,400	8
12	Portland, OR	80	13.6	\$11.1	7,600	18
13	Boston, MA	74	28.0	\$40.3	16,700	11
14	Seattle, WA	69	20.1	\$15.4	13,500	10
15	Detroit, MI	62	12.9	\$12.3	12,500	14
16	Sacramento, CA	61	8.5	\$9.1	4,300	21
17	San Diego, CA	58	9.7	\$13.4	4,300	n/a
18	Austin, TX	55	8.0	\$6.2	4,800	13
19	Miami, FL	54	12.3	\$12.6	10,800	23
20	Phoenix, AZ	52	11.1	\$11.4	9,900	22
21	Ogden, UT	51	5.5	\$2.8	2,200	n/a
22	Charlotte, NC	44	4.7	\$2.2	2,300	18
23	Indianapolis, IN	39	8.2	\$4.9	6,100	n/a
24	Des Moines, IA	36	4.6	\$1.9	3,600	n/a
	Fort Collins, CO	36	2.5	\$2.1	1,300	n/a
	Philadelphia, PA	36	12.5	\$14.3	8,700	17
25	Louisville, KY	35	4.2	\$1.8	2,700	n/a

Source: EPA

What is driving the green market?

The case for green building is not a hard one to make: Green buildings provide numerous advantages over traditionally constructed buildings, including reduced material usage, lower energy and operating costs, and even higher property values in some cases. Although there remain marginally higher upfront costs associated with building green, the long-term economic benefits are compelling given significantly lower operating costs. Moreover, our research indicates the real estate community increasingly recognizes other benefits of green buildings, such as higher employee productivity, lower absenteeism, and increased employee retention.

Besides these reasons, the USGBC points to the following factors as expediting the growth of green building:

- Unprecedented level of government initiatives
- Heightened residential demand for green construction
- Improvements in sustainable materials

As green buildings deliver on the promise of being comfortable, healthy, and energy-efficient, the green building movement will maintain its significant momentum, in our view.

Consider these important developments:

- The federal government has mandated that all federal buildings must be green. In fact, the General Services Administration (GSA) announced that all future construction within its \$12 billion portfolio must be LEED-certified.
- Major corporations are increasingly going green with their construction/refurbishment plans. Notable examples include Wal-Mart, GM, Toyota, Home Depot, Citigroup, Bank of America, and Wells Fargo.

THE LEED™ POINT SYSTEM FOR GREEN BUILDINGS

The USGBC pioneered the LEED rating system (Leadership in Energy and Environmental Design) as a “national consensus-based, market-driven building rating system designed to accelerate the development and implementation of green building practices. In short, [LEED] is a leading-edge system for designing, constructing, and certifying the world’s greenest and best buildings.” In a relatively short period of time, LEED has become the de facto green building standard in the US. Over five billion square feet of commercial space is LEED registered or certified and the USGBC’s membership has increased dramatically since the LEED Green Building Rating System was first released in 2000.

One of the advantages of the LEED system – and one of the main reasons it has achieved success – is its relative simplicity. Green buildings are certified with a consensus-based rating system that provides for 110 possible points. The level of LEED certification is based on the number of points recorded in six separate categories: 1) sustainable sites; 2) water efficiency; 3) energy and atmosphere; 4) materials and resources; 5) indoor environmental quality; 6) innovation and design process; and 7) regional priority. For new construction and major renovations, LEED green buildings are classified as follows:

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

Notably, LEED 2009 increases the total number of LEED points available to 110, up from 69. (There are 100 points available for certification purposes; 10 points are classified as “bonus credits.”) This change was made “so that a given credit’s point value more accurately reflects its potential to either mitigate the negative or promote the positive environmental impacts of a building,” according to the USGBC. For example, one of the criticisms of the previous LEED point system was that installing a bike rack earned one point, but so did installing an efficient heating/air conditioning system. In general, LEED 2009 aims to award points on a more logical basis.

Key changes in LEED 2009:

Figure 6: LEED 2009 vs. previous system

Category	LEED 2009	Previous LEED system	Change
Sustainable Sites	26	14	+12
Water Efficiency	10	5	+5
Energy & Atmosphere	35	17	+18
Materials & Resources	14	13	+1
Indoor Environmental Quality	15	15	+0
Innovation & Design Process	6	5	+1
Regional Bonus Credits	4	--	+4
TOTAL	110	69	+41

Source: USGBC

- **Energy & atmosphere:** This category features the most substantive change, as available points have more than doubled to a total of 35. Basically, the USGBC wants to award many more points for optimizing energy performance, since buildings are voracious users of energy, consuming more than 70% of the electricity load in the US, according to the Department of Energy. The USGBC has stated that buildings are responsible for 39% of the CO₂ emissions in the US, and minimizing greenhouse gas emissions is now a top priority.
- **Water efficiency:** The major change in this category is that a 20% water use reduction is now required of any building seeking LEED certification. Beyond that requirement, point values in each of the subcategories, such as water efficient landscaping, innovative wastewater technologies, and >20% water use reductions, would earn 2 points each, up from 1 previously.
- **Sustainable sites:** Here, LEED 2009 is encouraging greater “development density and community connectivity” and “alternative transportation” in the form of public transportation access. The goal is to increase emphasis on urban projects and building in downtown areas that have adequate public transportation for commuters. (For the record, bicycle storage and changing rooms would still earn one point – the same as the current system.)
- **Regional bonus credits:** This is the only entirely new points category in LEED 2009. The USGBC’s goal here is to have a system that recognizes “regional environmental priorities.”

In summary, LEED 2009 aims to improve on a system that was already effective. The changes aren’t radical, but do blur the distinction between older LEED certified buildings and new ones since the point systems differ, in our view.

LEED systems applicable to much more than new construction

Importantly, the LEED rating system has application well beyond new construction: there are LEED rating systems for existing buildings (operations and maintenance), commercial interiors, core and shell, schools, retail, healthcare, homes, and neighborhood development. As a result, the LEED system can and does attract a wide range of industry professionals, such as contractors, engineers, interior designers, architects, etc. This breadth has given the LEED program added credibility and facilitated greater professional cooperation on projects that aim for LEED certification.

A “DOLLARS AND SENSE” ARGUMENT FOR GOING GREEN

One of the most pressing questions in the green building market is whether “going green” actually makes economic sense. Interestingly, studies have shown that the perceived costs for new green construction projects are as much as three times as high compared with the actual costs. Most recently, a 2009 study by the World Business Council for Sustainable Development showed the *perceived* cost of making green improvements to an existing building was 17% higher than the actual cost.

Despite these concerns, plenty of new green construction and retrofit projects are going forward anyway, suggesting that real estate industry participants and investors increasingly recognize the long-term economic value of going green. Their judgments do have a basis in reality, as a recent report from investment consulting firm Mercer cites several key studies showing an economic benefit for being (or going) green:

- A January 2009 study by Maastricht University found a 16-17% premium on green building transaction prices (sales per square foot).
- A 2008 University of Arizona study found Energy Star properties commanded higher market values, higher rents and lower expenses compared to properties with no energy efficiency rating.
- A 2009 study by Henley University Business School (Reading, UK) found commercial building price premiums of 10% and 31%, respectively, for Energy Star and LEED-certified buildings.
- A 2008 study by CoStar Group found LEED-certified buildings achieved an \$11.33/sq. foot premium on rentals compared to non-LEED peer buildings. In addition, LEED-certified buildings generated a \$181/sq. foot premium in sales prices vs. non-LEED peer buildings. Meanwhile, Energy Star buildings also achieved rental and sales price premiums compared to non-Energy Star peer buildings, though the premiums were relatively small.

Mercer says that “market demand for energy-efficient real estate is growing and supply is limited – a combination that can lead to price premiums and cost savings for [real estate] investors.” Mercer advises real estate investors/building owners to assess their entire property portfolio to first identify poorly performing buildings in need of energy efficiency upgrades. Often times, “no- or low-cost energy efficiency improvements can have quick and dramatic impacts on property operating costs.” Thus, poorly performing buildings (from an energy-efficiency standpoint) “represent an opportunity for a significant investment gain when it comes to energy efficiency.”

This strategy makes perfect sense, in our view. Think of energy-inefficient buildings as akin to “value” stocks – their depressed values typically reflect subpar operating performance. However, savvy investors may see considerable upside potential if the inherent value of the assets can be unlocked. Frequently, energy efficiency retrofits are the solution here – and these retrofits needn’t be even that complicated or expensive, according to Mercer’s analysis.

For example, EPA guidelines for best practices in energy-efficiency retrofit projects call for lighting upgrades first, followed by reducing supplemental load sources, and then adjusting/optimizing air-delivery systems. This is not rocket science, just basic common sense.

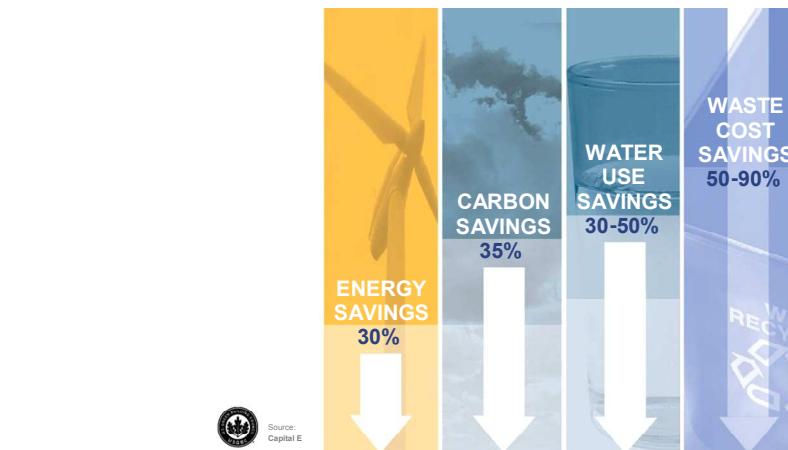
Although a number of factors are driving the trend toward energy efficiency – i.e., legislative mandates, social/environmental considerations, and a desire to reduce operating costs – we conclude that real estate investors/owners increasingly recognize the higher asset value of green buildings. Simply put, if green (energy-efficient) buildings can reliably command higher market prices than their less-efficient peers, more buildings are going to go green. So far, the evidence backs up this theory. And we suspect that as the credit market loosens, energy-efficiency retrofits are likely to be the top agenda item for real estate owners who lacked the capital for upgrades – particularly as they seek ways to recapture equity value lost in the commercial real estate downturn.

How green construction lowers operating costs

Some of the key economic benefits of a green building include the following:

- Lower utilities bills and operating costs because of energy and water efficiency systems;
- Lower waste and dumping costs because of landfill diversion measures (recycling/reuse programs) used during construction and occupancy;
- Lower energy bills from efficiencies in HVAC systems;
- Increased occupancy rates and reduced tenant turnover;
- Electricity company rebates because the on-site renewable energy generated can be more than the building itself uses. Excess electricity can be sold back to the grid under the concept of net metering that is gaining prominence;
- Fewer employee sick days taken and heightened worker productivity because of improved indoor air quality.

Figure 7: Average savings of green buildings



Source: Capital E Analysis

Recent research has linked monetary value to various green features. The chart below highlights how achieving certain green objectives can lead to lower operating costs, improved returns, and increased economic value.

Figure 8: How building green can pay off

Green Objectives	Green Strategies/Features	Green Impact	Theoretic Linkage to Value
Sustainable site development	<ul style="list-style-type: none"> * Reduce site disturbance and soil erosion impacts * Use of natural drainage systems and preservation/restoration of natural site features * Landscape and orient building to capitalize on passive heating and cooling 	<ul style="list-style-type: none"> * Improved site aesthetics * Greater public support and accelerated local approval process * Lower energy costs 	<ul style="list-style-type: none"> * Reduced development costs, improved marketability, reduced ongoing maintenance costs, improved natural appearance, higher sales/rents, absorption and re-tenanting, NOI/ROI benefits * For gross leases, higher NOI
Water efficiency	<ul style="list-style-type: none"> * Use captured rainwater for landscaping, toilets, etc. * Treat and re-use greywater, excess groundwater, and steam condensate * Use low-flow fixtures and fittings * Use closed-loop systems and other water reduction technologies 	Lower water consumption/costs	<ul style="list-style-type: none"> * Lower tenant common area maintenance charges. Direct NOI benefit for gross leases, potentially higher NOI for net leases requires communicating benefit to tenants
Energy efficiency	<ul style="list-style-type: none"> * Use passive solar heating/cooling and natural ventilation * Enhance penetration of daylight to interior spaces * Use thermally efficient envelope to reduce perimeter heating and size of HVAC * Use energy management systems, monitoring, and controls 	<ul style="list-style-type: none"> * Lower capital costs * Occupant benefits * Lower energy costs * Operational savings/reduced capital cost of mechanical systems 	<ul style="list-style-type: none"> * Reduced operating costs, longer life cycle, lower development costs * Improved occupant productivity, lower churn, turnover, tenant inducements, etc. * Higher net income for gross leased buildings, improved yield * Lower operating costs. On gross leases, higher ROI/NOI. On net leases, potential for improved ROI/NOI
Indoor environmental quality	<ul style="list-style-type: none"> * Control pollutant sources * Use low-emission materials * Ventilate before occupancy * Enhance penetration of daylight and reduce glare * Provide outdoor views, individual occupant controls 	<ul style="list-style-type: none"> * Superior indoor air quality, quality lighting, and thermal quality * Fewer occupant complaints * Higher occupant productivity 	<ul style="list-style-type: none"> * Risk reduction * Greater marketability * Faster sales and lets * Improved churn/turnover * Higher ROI/NOI
Reduced consumption of building materials	<ul style="list-style-type: none"> * Select products for durability * Eliminate unnecessary finishes and other products * Reuse building shell from existing buildings and fixtures from demolished buildings * Use salvaged/refurbished materials Design for adaptability 	<ul style="list-style-type: none"> * Longer building lifecycle * Lower maintenance costs 	<ul style="list-style-type: none"> * Lower depreciation typically after higher investment costs * Lower construction costs, probably lower operating/maintenance costs, higher ROI/NOI

Keys: NOI = net operating income; ROI = return on investment; net lease = lease that requires lessee to pay operating costs resulting from their occupation of premises

Source: Royal Institution of Chartered Surveyors (RICS) and Canaccord Genuity

Green building costs: perception vs. reality

Although green building clearly is growing in popularity and acceptance, a longstanding perception that building green is expensive and/or not cost-effective remains despite a growing number of research studies and real-world examples to the contrary. While the projected higher cost of building green remains a major reason developers and design teams decide not to build green, we conclude that the significant cost savings and attractive ROI of green building today are becoming increasingly harder to overlook. In certain instances, in fact, green building projects can actually be less expensive than traditional construction due to resource-efficient strategies that allowed builders to downsize costly mechanical, electrical, and structural systems. Industry perceptions about green building costs won't change overnight, of course, but the tide is turning, in our view, particularly as more and more high-profile projects prove the long-term value of building green.

Recently the US Green Building Council released a "Green Jobs Study" prepared by consulting firm Booz Allen Hamilton. As you might expect, the findings of the study were hardly a surprise – green building does, in fact, create lots of "green collar" jobs and economic growth – but the data and assumptions to reach these conclusions were worthy of note, in our view.

In particular, the report attempts to quantify the savings associated with green construction. As the table shows, the greatest savings come from lower energy expenditures, followed by lower operations and maintenance costs, and to a much lesser extent, savings from reduced trash generation and water usage. These estimates were derived from 10 separate reports comprising 69 LEED certified buildings. From 2009-

2013, the report estimates that green construction will generate \$6 billion in energy savings, \$3.8 billion in O&M savings, \$249 million in trash savings, and \$645 million in water savings.

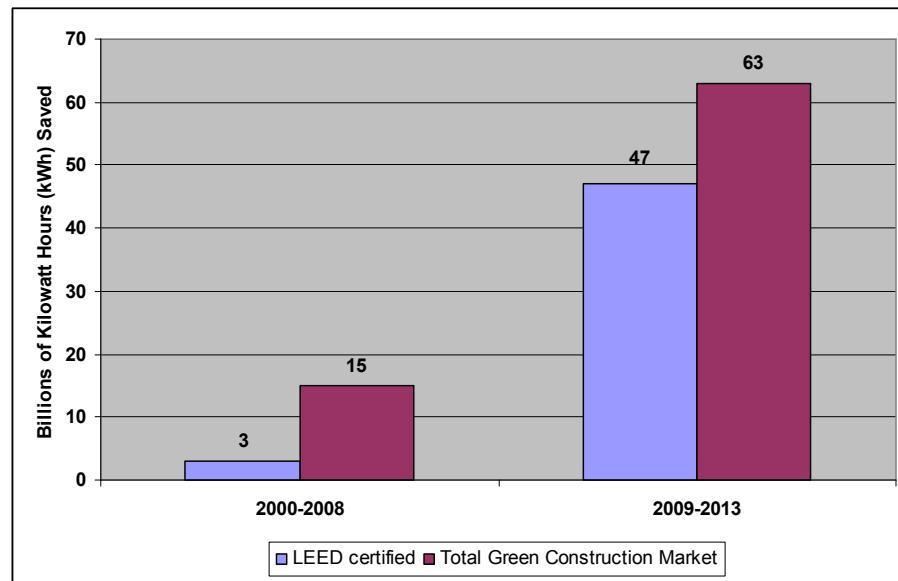
Figure 9: Green construction market value and related savings

Year	Construction Value (2008 \$M)	Annual Square Feet (M)	Cumulative Square Feet (M)	Energy Savings (\$0.52/sq. ft.) (2003 \$M)	O&M Savings (\$0.32/sq. ft.) (2003 \$M)	Trash Savings (\$0.05/sq. ft.) (2003 \$M)	Water Savings (\$0.02/sq. ft.) (2003 \$M)
2000	\$4,571	31.6	31.6	\$16	\$10	\$1	\$2
2001	\$5,228	36.1	67.7	\$35	\$22	\$1	\$4
2002	\$5,810	40.1	107.8	\$55	\$35	\$2	\$6
2003	\$6,745	46.6	154.4	\$79	\$50	\$3	\$8
2004	\$8,242	56.9	211.3	\$108	\$68	\$4	\$12
2005	\$10,028	69.3	280.6	\$144	\$90	\$6	\$15
2006	\$17,464	120.6	401.2	\$205	\$129	\$8	\$22
2007	\$28,180	194.6	595.8	\$305	\$191	\$13	\$33
2008	\$41,921	289.5	885.3	\$453	\$284	\$19	\$48
2009E	\$51,814	357.8	1,243.1	\$636	\$399	\$26	\$68
2010E	\$64,042	442.3	1,685.4	\$862	\$541	\$36	\$92
2011E	\$79,156	546.7	2,232.1	\$1,142	\$716	\$47	\$122
2012E	\$97,837	675.7	2,907.8	\$1,487	\$933	\$61	\$159
2013E	\$120,926	835.1	3,742.9	\$1,915	\$1,200	\$79	\$204

Source: USGBC (from Booz Allen Hamilton)

Looking more closely at the projected energy savings, it is estimated that green construction will conserve 63 billion kilowatt hours from 2009-2013, up from 15 billion kWh from 2000-2008. In other words, kWh savings in the five-year period from 2009-1013 are expected to be more than four times as great as the nine-year period from 2000-2008.

Figure 10: Billions of Kilowatt hours saved from LEED-certified buildings and the total green construction market



Source: USGBC (from Booz Allen Hamilton)

Interestingly, the study estimates that LEED-certified buildings will be responsible for 75% of the total energy savings in the 2009-2013 period, underscoring the stringent energy efficiency standards required in LEED buildings relative to other green buildings. That probably reflects one of the most significant changes to the LEED rating system: LEED 2009 has a greater than 2x increase in the number of available points in the energy & atmosphere category to optimize energy performance in newly constructed buildings.

How green building costs can be overestimated

One of the main difficulties with estimating the construction costs of a green building versus conventional construction is that green building is still a relatively new phenomenon. Many architects, designers, developers, and builders lack experience with green building, and as a result, overestimate the costs of building green or fall into common “traps” that can lead to project cost inflation. Some of these “traps,” as outlined by Geof Syphers in a 2003 report presented at the Greenbuild industry trade show, include the following:

1. Failing to have a clear green design goal
2. Incorporating green design in mid-project
3. Lacking a single point of responsibility for the LEED process
4. Lacking experience with or knowledge of LEED
5. Lacking enough time to research materials and technologies options

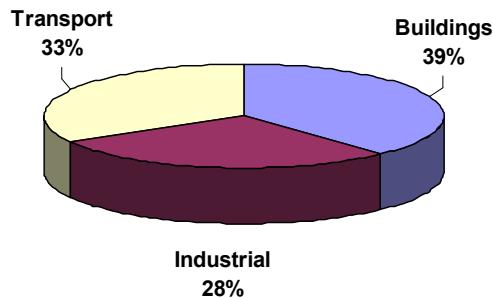
As we can see, several of the factors that often lead to higher green building costs have little or nothing to do with the process of physically constructing a green building. Instead, costs are often inflated simply due to a lack of planning and experience.

We actually see this as a positive for the green building industry, since it suggests that project costs should continue to decline as more and more developers gain experience with sustainable construction. While we acknowledge that green building generally does come with a small cost premium, the benefits of green building frequently more than offset these additional costs, as we discuss next.

ENVIRONMENTAL CONCERN ARE DRIVING GREEN BUILDING AND ENERGY EFFICIENCY INITIATIVES

Vehicles are often considered the single largest cause of carbon emissions, but the reality is that buildings are. In fact, buildings (both residential and commercial) are responsible for 39% of all carbon emissions in the US, compared to 33% for the entire transportation sector and 28% for the industrial sector, according to previously published Energy Information Administration (EIA) data. The USGBC has stated that US buildings alone are responsible for more CO₂ emissions annually than those of any other country except China. The majority of carbon emissions are produced by the combustion of fossil fuels to provide heating/cooling, electricity, and of course, lighting for homes and businesses. Notably, buildings' carbon emissions would be even higher if the manufacture and transport of building construction and demolition materials were considered.

Figure 11: CO₂ emissions in the US by sector



Source: Energy Information Administration**Buildings are energy hogs**

Put in the simplest terms, buildings (both residential and non-residential) are energy hogs. They consume more than 70% of the electricity load in the US, according to the Department of Energy. This represents a mind-boggling 40 quadrillion BTUs (British thermal units) of energy in 2005 at a cost of over \$300 billion. Moreover, buildings often have a very long lifespan, often 50-100 years, during which they typically consume energy and are responsible for CO₂ emissions on a more or less continuous basis.

Figure 12: Buildings consume huge quantities of energy and resources

Electricity	72% of consumption
Water	14% of all potable water use
Materials	40% of raw materials use
Waste generation	30% of waste output (136 million tons annually)
Energy	39% of use

Source: DOE, USGS, Worldwatch Institute, EPA**How green building helps the environment**

The extent of buildings' "carbon footprint" points to a significant need to reduce their environmental impact. While green building isn't necessarily a complete solution, it represents the most practical and realistic alternative, in our view. Green buildings can reduce energy consumption and carbon emissions in numerous ways:

- Use of more efficient heating, ventilation, and air conditioning systems
- Optimization of daylight and implementation of the state of the art lighting systems
- Use of recycled content building and interior materials
- Reduction in potable water usage
- Use of renewable energy, such as solar, wind, and geothermal power
- Improved siting (e.g., near public transportation)
- Use of locally manufactured building materials

Despite buildings' negative impact on the environment currently, there is cause for long-term optimism. It is estimated that by 2035, approximately 75% of the building stock in the US will be either new or renovated. As a result, we conclude there is ample opportunity over the next couple of decades to substantially reduce the environmental impact of buildings and their contribution to climate change.

NEW BUILDING CODE STANDARDS WILL ACCELERATE ADOPTION OF GREEN CONSTRUCTION

ASHRAE 189.1 standard a major step toward greening commercial building codes

Unless you're a contractor or otherwise closely involved in the construction industry, you might have missed a very significant news item recently: the release of ASHRAE Standard 189.1. ASHRAE standards are critically important within the construction industry, as they are often referenced in municipal building codes. (ASHRAE stands for American Society of Heating, Refrigerating, and Air-Conditioning Engineers.) So the release of a new standard is something worth taking note of, since it is likely to eventually become accepted in the building industry.

In conjunction with the Illuminating Engineering Society of North America (IES) and the US Green Building Council (USGBC), ASHRAE recently released Standard 189.1, which is designed to be "a new standard for the design of high-performance green buildings." In simple terms, ASHRAE 189.1 incorporates a variety of mandatory requirements and guidelines that will improve buildings' energy efficiency and help buildings move toward the goal of net-zero energy usage. Similar to the US Green Building Council's LEED system, ASHRAE standard 189.1 addresses site sustainability, water use efficiency, energy efficiency, indoor environmental quality, and the building's impact on materials, resources, and the atmosphere. Standard 189.1 calls for a significant energy reduction over the current 90.1 standard, which already "influences building designs worldwide as the basis for building codes, and [is] the standard for building design and construction throughout the United States," according to ASHRAE.

We note that ASHRAE 189.1 is a commercial building standard, and as such, does not apply to single-family houses, multi-family structures (three stories or fewer), mobile homes or manufactured homes. Also, Standard 189.1 is not a green building rating system.

One of the key differences between the USGBC's LEED system for green buildings and Standard 189.1 is that LEED is designed as a purely voluntary system. In other words, if a property owner wants to design a building to stringent LEED specifications, he can choose to go through the appropriate process for doing that. By contrast, ASHRAE standards are frequently written into local building codes, thereby making them mandatory in those jurisdictions. Although Standard 189.1 will be voluntary initially, our research suggests it is likely to be implemented in several major cities, such as Atlanta, Baltimore, Chicago, and Boston, among others. Once the standard becomes implemented, it becomes part of a city's building code and therefore becomes mandatory.

That's why we view the publication of ASHRAE 189.1 as an important event within the green building industry. This new standard represents a big first step toward "greening" the commercial building code across the country. It's a long process, to be sure, as

individual cities and towns have to sign off on it, but if history is a guide, ASHRAE 189.1 will be widely adopted, in our view.

Facts and figures about Standard 189.1

Here are some additional details on the new 189.1 standard and also how it compares to the previous standard, known as 90.1.

- Unlike LEED or other green building rating systems, 189.1 is “primarily based on mandatory requirements...that establish baseline criteria for a high-performance green building.” *The reason that 189.1 is written in mandatory language is to enable the standard to be adopted within building codes.*
- Standard 189.1 applies to: 1) new buildings and their systems; 2) new portions of buildings and their systems; and 3) new systems in existing buildings.
- The US Dept. of Energy has estimated that 189.1 can generate site energy savings ranging from 10% to 34% over standard 90.1. The weighted average energy savings across all buildings was 18%, according to DOE calculations. However, since ASHRAE has adopted additional energy saving measures since the DOE study, ASHRAE says that the published version of 189.1 is expected to yield even greater energy savings.
- Because 189.1 establishes a green building standard, the code should benefit the real estate and building community, as well as commercial real estate investors. Builders/developers should benefit because 189.1 sets out precise guidelines for constructing/retrofitting a building to green standards, making it more efficient to build these types of buildings in different markets. Meanwhile, commercial real estate investors should benefit too, since 189.1 will enable them to more easily and accurately value green buildings to one another, even if the properties are located in different markets.

International Green Construction Code released

If ASHRAE 189.1 was a key first step toward “greening” commercial building codes across the country, the next step occurred this past March, when The International Code Council (ICC), ASHRAE, the US Green Building Council, and the Illuminating Engineering Society of North America jointly announced the launch of the International Green Construction Code (IGCC). (Additional participants in the IGCC included the American Institute of Architects and the American Society for Testing Materials.)

“The IGCC provides the building industry with language that both broadens and strengthens building codes in a way that will accelerate the construction of high-performance green buildings across the United States,” according to a report by *Building Design & Construction*. What’s new here is the collaboration of these separate trade groups to develop a single code for green construction – something *BD&C* called “perhaps the most significant development in the buildings industry in the past ten years.”

Why yet another green building standard is needed

You may be wondering what the purpose of the IGCC is, given the existence of many green building standards such as LEED, Energy Star, NAHB Green, and most recently, ASHRAE 189.1? It’s a reasonable question. The ICC says that “the objective of this new

project is to develop a Green Building Code for traditional and high-performance buildings that is consistent and coordinated with the ICC family of Codes and Standards.” Think of it this way: the IGCC will function as an overlay to existing ICC building codes, which are already in widespread use throughout the country. Because conflicts have arisen between traditional ICC building codes and various green building standards, there is a need for a single green building standard to be integrated into conventional code provisions. That’s where the IGCC fits in.

In many respects, building code requirements in the IGCC are similar to those in ASHRAE Standard 189.1. In fact, the IGCC specifically states that jurisdictions have the option of using ASHRAE 189.1 as an “alternate path of compliance.” The major criteria in both the IGCC and ASHRAE standard 189.1 are 1) energy efficiency; 2) materials and resource use; 3) site development and land use; 4) indoor environmental quality; and 5) water resource conservation and efficiency.

What about LEED?

So where does that leave the USGBC’s LEED system, often considered the “gold standard” in green building? Another good question. First of all, we must point out the obvious: the USGBC would not have signed on to this if the organization believed that the publication of the IGCC was somehow going to dampen market demand for LEED-certified projects. Rick Fedrizzi, president, CEO and founding chairman of the USGBC, said that his organization’s mission “...is market transformation and we’ve long recognized the need to reach beyond the market leaders served by LEED to accomplish this goal.”

To put it into less delicate terms, the IGCC is basically intended to serve the “mass market,” while LEED will continue to serve the “luxury” segment of the new construction/retrofit green building market. We’d note that LEED standards, which will continue to evolve, aim to be on the cutting-edge of key issues such as materials usage, maximization of energy efficiency, water conservation, etc. By contrast, the IGCC outlines a minimum set of green building standards that can be integrated into municipal building codes.

Final version of IGCC expected in 2012

The release of the IGCC version 1.0 is just a first step – there is a public comment period now under way. Version 2.0 of the IGCC is scheduled to be released in early November, followed by additional hearings/reviews throughout 2011. The final version of the IGCC is expected to be published in early 2012, according to the ICC.

We view the IGCC (and ASHRAE standard 189.1) as major steps in the mainstream adoption of green building practices. When we officially started covering the green building market back in 2007, we wrote that “our research leads us to conclude that we are the beginning state of what poised to be one of the most significant secular trends in the global building/construction market – the green building movement...Longer term, we conclude green building practices will become the norm in the construction industry.” With the publication and eventual adoption of the IGCC and ASHRAE standard 189.1, that statement is coming to fruition, in our view.

LEGISLATION/REGULATION DRIVING GREEN CONSTRUCTION

In the US, local and state legislation and incentives have been a significant catalyst in the growth of the green building market. By mandating green building certification, and by offering tax breaks and other incentives, governments across the country are compelling the construction industry to reexamine its building practices in fundamental ways.

Governments are responding to the rising cost of resources, such as energy and water, and also acting on the public's growing environmental concerns, particularly those surrounding the harmful effects of carbon dioxide emissions.

At the local level, governments provide many different incentives to encourage green building in the private sector and also to help building projects meet legislated mandates. Some incentives serve to offset the additional cost that is sometimes incurred when building green or becoming LEED certified. Local governments also dangle the carrot of expedited or priority permit review. This is one of the more tempting incentives, since the faster buildings can go up, the sooner the payback period can start. In some instances, a permit that would normally take six months to be approved can be granted in as little as three.

At the state level, many state governments support – and some even mandate – green building requirements for particular types of buildings. Most notably, California recently became the first state to mandate green building for most new construction. Other states that mandate green building for certain projects include, Arizona, Colorado, Maine, Nevada, New Mexico, Virginia, and Washington.

Like many local municipalities, states link green building mandates and incentives with the LEED program, furthering standardization in green building. Partly as a result, the number of LEED projects today is at an all-time high. The USGBC reports that as of May 2010, various LEED initiatives, including legislation, executive orders, resolutions, ordinances, policies, and incentives are found in:

- 45 states, including 206 localities (142 cities, 36 counties, and 28 towns)
- 34 state governments
- 14 federal agencies or departments
- 17 public school jurisdictions
- 41 institutions of higher education

International green building programs also gaining popularity

One of the most widely known international environmental assessment methods is known as BREEAM, which stands for Building Research Establishment Environmental Assessment Method. According to the Building Research Establishment (BRE), which created the system in the UK back in 1990, there are over 110,000 buildings certified and more than half a million registered for certification under BREEAM. Specific versions of BREEAM "are available for the UK, the Gulf and Europe, but BREEAM schemes can be tailored for use for any specific country or region," according to BRE.

Similar in scope to the USGBC's LEED program, BREEAM addresses the following issues:

- Management
- Health and well-being
- Energy
- Transport
- Water
- Minerals and waste
- Land use and ecology
- Pollution

Individual countries within Europe have developed their own standards for green building or energy efficiency. These countries (and their respective programs) include Finland (PromisE), France (HQE), Germany (DGNB and CEPHEUS), Italy (Protocollo Itaca and Green Building Council Italia), Netherlands (BREEM Netherlands), Portugal (Lider A), Spain (VERDE), and Switzerland (Minergie).

Australia going green

In response to a severe drought, Australia implemented legislation tied to its Green Star environmental rating system. One of Australia's largest cities, Brisbane, has drafted and implemented legislation that uses a variety of measures to aid and encourage the greening of Australia's built environment. Because of Australia's water shortage and its associated economic impact, this type of legislation was drafted to quickly help reduce the environmental impact of Australia's buildings.

Canada has adopted LEED

In Canada, meanwhile, the country formed the Canada Green Building Council in 2002 and in July 2003 obtained an exclusive license from the USGBC to adapt the LEED rating system to suit Canadian climates, construction practices, and regulations. LEED Canada is very similar to the US system, comprising the five main categories of sustainable site development, water efficiency, energy efficiency, materials selection, and indoor environmental quality. Just as within the US LEED point system, the innovation and design process category addresses sustainable building expertise as well as design measures not covered under the five environmental categories. As of June 2010, Canada had 188 LEED Canada projects, plus another 267 LEED projects under the US rating system.

Governments provide a positive push

Incentives and regulations provided by governments help to normalize the green building movement and provide an extra push to encourage green building. Government incentives, such as tax credits, rebates, expedited permits and density bonuses, speak directly to those involved in the design, building and decision-making process, and help increase the adoption of sustainable building practices.

GREEN BUILDING RETROFITS GAINING MOMENTUM

“Going green” goes mainstream

Once considered a fad by some, “going green” has now become a business imperative as companies seek to reduce costs, enhance worker productivity/morale, and respond to the demand of their clients/customers who are also adopting more sustainable business practices.

Because most everyone in the commercial building sector knows about the benefits of reducing energy usage and increasing efficiency, the number of energy-efficiency retrofits is growing. *PlanetArk* reports that “spurred by steadily rising utility bills, the need to rein in costs in the recession, a host of government tax incentives and increasing awareness of carbon footprints, energy-saving building renovations are in vogue.” Two recent high-profile examples include the Empire State Building and the Sears Tower (now known as the Willis Tower), which conducted and implemented top-to-bottom energy retrofits. Closer to home, our own Boston offices just got an energy-efficiency makeover, which included much-improved windows to limit solar heat transfer. In addition, our San Francisco office building recently received a LEED Silver designation by the USGBC.

Huge market opportunity for energy-efficient retrofits

Deloitte has estimated that as little as one billion square feet of the approximately 70 billion square feet of US office space have been retrofitted to improve energy efficiency. Separately, Pike Research has estimated the value of “untapped” energy-efficiency projects equals \$400 billion, and that the energy services industry could triple in size by 2013. Interestingly, McKinsey & Co. has projected that US investments of \$520 billion in building efficiency initiatives through 2020 would yield approximately \$1.2 trillion in energy savings and reduce greenhouse gas emissions by 1.1 gigatons annually. McKinsey estimated that 35% of the end-use savings can come from the residential sector, while 40% can come from the commercial sector.

As a rule of thumb, energy efficiency retrofits typically have a payback period of less than five years, which is just a blip in the usual decades-long lifespan of commercial buildings. And as we noted previously, energy represents the single-largest cost element for building property owners. For these reasons, the energy efficiency retrofit market has grown by at least 22% per year since 2004, according to *PlanetArk*, and is likely to continue to generate significant growth in the years ahead.

Strong growth in store for green building retrofit market

While plenty of attention is paid to the construction of highly-efficient green buildings, the reality is that the vast majority of buildings are already built – and many (if not most) are hugely inefficient. As we point out elsewhere in this report, buildings are “energy hogs,” consuming greater than 70% of the electricity load in the US, according to the Dept. of Energy. Since buildings typically have a very long lifespan, often 50-100 years, they continuously consume energy and are therefore responsible for large amounts of CO₂ emissions over their life spans.

Given these dynamics, we conclude the market for green retrofits will grow strongly, particularly as the concept of green building continues to move into the mainstream. Volatile energy prices, government mandates/incentives, and rising demand from building owners and tenants are the primary driving forces behind making existing buildings greener, according to our research.

Accurately sizing the green building retrofit opportunity is a challenging proposition, but a McGraw-Hill report (“Green Building Retrofit & Innovation”) attempts to do so. McGraw-Hill estimates that green building today comprises 5-9% of retrofit and renovation market activity by value – and will grow to 20-30% by value by 2014. More specifically, McGraw-Hill (MGH) estimates the market opportunity for major projects (those over \$1 million) will range from approximately \$10 billion to \$15 billion in 2014, up from approximately \$2 billion to \$4 billion today. If we just use the midpoint of these estimates, MG-H’s forecast represents a CAGR of 33%. “The sectors with the largest green retrofit opportunity are education and office (~50% of all retrofit activity), with the biggest growth in retail,” according to the report.

As the green building retrofit market expands, energy efficient solutions (including both products and services) will represent the single largest opportunity for companies, according to MGH. This is not surprising, of course, since the primary goal of green retrofits is to make buildings more energy-efficient. MGH states that green retrofits are likely to involve the following initiatives:

- Installation of more energy-efficient lighting and/or making more use of natural daylighting
- Installation of more energy-efficient and mechanical systems
- Improved occupancy comfort inside the building
- Installation of more water-efficient plumbing
- Installation of more environmentally-friendly finishes and furnishings
- Upgrades to the building envelope

Because energy costs represent the single largest expense for building property owners, there is usually a high degree of motivation to undertake a green retrofit. Still, there are other important motivations that can come into play when property owners decide to begin a green retrofit project. According to MGH, These other factors include expectations for: increased property values, reduced time to lease retrofitted space, higher building occupancy, higher rents, and general environmental and social reasons (peer pressure, more or less, but in a good way).

Annual Johnson controls survey points to energy efficiency spending rebound in 2010

Johnson Controls (JCI: NYSE: \$28.12 | Not Rated), in conjunction with the International Facility Management Association (IFMA), recently released its annual “Energy Efficiency Indicator” report for 2010. The report provides a unique and informative look at the trends in energy efficiency priorities and practices taking place within the North American commercial building market.

What makes the report particularly valuable is that it surveys “decision makers responsible for commercial buildings and their energy use.” These are the people who have capital- or operations-related budget responsibility for their organization’s facilities.

Moreover, their job responsibilities must include reviewing/monitoring energy usage and/or proposing or approving initiatives to make their buildings more efficient. A total of 1,435 such people (96% from the US, 4% from Canada) across a wide variety of industry sectors responded to the survey. Here are some of the highlights:

- Although 65% of the respondents “are paying more attention to energy efficiency than last year,” that’s actually down from 71% that made the same claim in the 2009 survey.
- Similarly, 52% now say that “energy management is extremely or very important to [their] organization,” but that’s down from 58% last year.

It’s not exactly clear from the report (or related webcast presentation) as to why these figures are down, but the economic recession must have played a role. For example, the study notes that 41% of respondents said they invested less in efficiency last year. (Interestingly, 32% actually invested more while 27% invested at “historically consistent levels.”) Besides the economic downturn, we wonder whether respondents can’t pay *more* attention to energy efficiency because they’ve already begun to address this key issue within their respective organizations.

- **Energy efficiency spending is expected to rebound in 2010**, as 52% plan to make such capex investments over the next 12 months. That’s up from 46% making the same claim last year. Key sectors expected to invest in these efficiency projects include finance/insurance, healthcare, manufacturing, and government/education.
- **Both new construction and retrofit starts are projected to increase in 2010**. Survey respondents indicated that 22% are undergoing or plan to undergo new construction projects over the next 12 months (up from 16% last year). Meanwhile, 30% are undergoing or plan to undergo retrofit projects over the next 12 months (up from 22% last year).
- **Investment criteria for energy efficiency projects remain basically steady**. According to the JCI/IFMA survey, 44% of respondents won’t allow a significant energy efficiency investment to have a payback period longer than three years. That’s unchanged from last year’s figure. However, we note that 87% now won’t allow a payback period longer than 10 years, which is up from 83% over the past two years. The average maximum payback for an energy efficiency investment was calculated to be 3.2 years, which is down from 3.5 years in last year’s survey.
- **Solar remains the most popular renewable energy technology, but less so than last year**. The survey reported that 31% of respondents are considering or utilizing solar electric technology in new construction or retrofit projects while 20% are considering or utilizing solar thermal technology. However, both percentages are down on a y/y basis, as 46% were considering/utilizing solar electric in 2009 and 26% were considering/utilizing solar thermal in 2009. Other technologies showing decreased consideration levels included geothermal, wind, and hydropower. The only technology to gain interest/use on a y/y basis was biomass (now up to 7%, from 5% last year).

In summary, the study made the following observations and conclusions (in their words):

- **Efficiency investment remains strong:** Energy cost concerns, public image, and climate leadership are driving investment. Larger organizations are more likely to make efficiency investments.
- **Buildings' efficiency is top carbon strategy:** Despite lowered legislation expectations, more organizations [are] setting voluntary GHG (greenhouse gas) goals.
- **Capital availability remains a strong barrier.** Organizations rely primarily on internal capital budgets for efficiency and renewable energy investments rather than seeking external financing.

GB INDUSTRY CHALLENGES

Clearly the green building movement is gaining visibility among the public and within the construction industry itself. More and more green buildings are going up worldwide and there seems to be a growing desire to act responsibly about how and where buildings are constructed. Despite this early success, we believe the green building movement nonetheless faces several challenges as it moves more toward the mainstream. We highlight the following potential obstacles:

1. **Misperceptions about green building costs.** As discussed earlier, there remain misperceptions about the overall cost of green buildings vs. traditional buildings.
2. **Unfamiliarity with green building practices.** The LEED program in the US and other green building programs elsewhere in the world are still relatively new. It will take time to better educate architects, designers, engineers, and construction workers on green building practices, regulations, and concepts.
3. **Resistance to change.** This is a natural human tendency and is not unique to the green building movement. Simply put, people are reluctant to change old habits and ways of thinking. Just because green building seems "hot" at the moment, it doesn't mean everyone is going to jump on the bandwagon in the near future.
4. **Need to streamline the LEED process.** One of the comments we have heard from those in the green building industry is that the LEED process can be very time-consuming and bureaucratic. Sometimes, builders want to build green but are turned off by the LEED system. Importantly, LEED 2009 attempts to address this concern and it will be interesting to see whether it is successful in this regard.
5. **GB still affected by cyclical nature of overall building market.** Even as we anticipate that GB will continue to gain market share, it should be emphasized that GB is still affected by macro trends within the overall building and construction market. If the construction industry remains in a downturn, it is likely that GB will follow.

CONCLUSION: GREEN BUILDING WILL BECOME THE “NORM” IN THE CONSTRUCTION INDUSTRY

We conclude the GB movement continues to gain popularity within the construction and renovation markets, driven by:

1. Growing government support through mandates, incentives and legislation;
2. The rising popularity of green building standards, such as LEED, Energy Star and others;
3. The introduction of new building codes, such as ASHRAE 189.1 and the IGCC, that will require higher levels of energy efficiency;
4. Real-world evidence that green buildings achieve higher market values, tenant occupancy levels, and lower operating expenses;
5. The rising popularity of energy-efficiency retrofit projects, given relatively rapid payback periods;
6. Heightened environmental concerns and a growing desire by corporations to be good “corporate citizens.”

Given current trends, we conclude that green building will ultimately become the “norm” in the construction industry, as accelerated market demand and attractive tangible returns have opened up the mainstream building industry to GB practices.

In the Appendix that follows, we provide capsule summaries of each green building-related company we currently cover. These summaries include a company description, rating, investment thesis, and investment risks.

APPENDIX: COVERED COMPANY PROFILES

APOGEE ENTERPRISES (APOG : NASDAQ : \$11.25 | HOLD)

Based in Minneapolis, Minnesota, Apogee Enterprises is the North American leader in supplying a wide range of high-performance architectural glass products to the North American non-residential market, including offices, high-end condominiums, entertainment venues, hotels, educational institutions, health care facilities, and government buildings. (We note the company has almost no exposure to the residential construction market.) The company applies ultra-thin coatings to plain architectural glass (commodity glass is purchased from outside glass vendors) to create colors, protect against hurricanes and bomb blasts, and improve the energy efficiency of windows. Apogee also provides finishing and installation services to the commercial architectural glass markets. The firm's architectural segment represents approximately 90% of total revenue. Apogee is also a leader in the market for custom picture framing glass, providing technical coatings that reduce the reflectivity of picture framing glass and protect against ultraviolet rays. The company's picture framing glass business represents approximately 10% of total revenue. Apogee was founded in 1949 and went public in 1971.

Investment thesis

Our research leads us to conclude that we are at the beginning stage of what is poised to be one of the most significant secular trends in the global building/construction market – the “Green Building” (GB) movement. While green building historically has represented little more than an interesting “niche market” driven by forward-thinking architects and builders, accelerated demand and attractive tangible returns are opening up the mainstream building industry to GB practices, in our view.

We conclude that Apogee's market share and brand-leading position in energy-efficient and aesthetic engineered glass for commercial buildings perfectly position the company to benefit materially from this secular trend. Although the near-term outlook for the company remains difficult due to the downturn in the nonresidential construction market, we conclude that the firm's focus on energy-efficient products and market-leading brand will help it to more than weather the current slowdown.

Investment risks

- 1) Apogee's architectural segment markets are highly competitive and cyclical. This business comprises roughly 90% of total revenue and is highly dependent on economic trends within the North American commercial construction industry. 2) Capacity utilization trends significantly influence the profitability of Apogee's architectural business. 3) The framing glass business is highly dependent on US consumer confidence and the health of the overall economy. This business is also dependent on a small number of customers for sales.

BALDOR ELECTRIC COMPANY (BEZ : NYSE : \$39.16 | BUY)

Based in Fort Smith, Arkansas, Baldor Electric Company is a leading manufacturer of industrial electric motors, power transmission products, drives, and generators. With approximately 9,500 customers (including original equipment manufacturers and distributors) in more than 160 industries, Baldor serves numerous markets in the US and throughout the world. The firm's motors, which range in size from subfractional to 15,000 horsepower, are used in a variety of industries, including agriculture, chemical, food and beverage, machinery manufacturing, petroleum exploration and production, medical equipment, mining, paper and packaging, semiconductor manufacturing, military, and water supply. Manufacturing facilities are located in the US, Canada, England, China, and Mexico. In January 2007, Baldor acquired the Reliance Electric business from Rockwell Automation. Reliance is a leading manufacturer of industrial electric motors and other power transmission products sold under the Reliance and Dodge brand names. Baldor has been in business since 1920.

Investment thesis

Recognized for its high-quality and efficient motors, Baldor maintains the leading market position within the North American industrial electric motor market. The global market for Baldor's motor business is estimated at \$18 billion, according to the company. Given the firm's leading market position, Baldor is well positioned to benefit from several key trends over the next few years, in our view. First, growing concerns over rising energy costs, particularly in the industrial sector, which consumes approximately 70% of all generated electricity in the US, are driving customers to purchase more efficient motors. Second, as green building continues to grow in popularity, we believe there is a corresponding trend toward the use of high-efficiency motors as a means of minimizing energy costs within buildings. Third, and perhaps most importantly, the 2007 EPAct mandates the use of a wide range of high-efficiency motors. This law, which goes into effect in 2010, will substantially increase the number of such motors Baldor sells, in our view, driving incremental sales growth and improving profitability.

Investment risks

1) Baldor is heavily exposed to the prices for raw materials, particularly including steel, copper, and aluminum. Higher raw materials prices may have a negative impact on the company's profitability. 2) As a global supplier of motors and related parts, Baldor is dependent on the health of the worldwide economy for its growth. Economic slowdowns are likely to negatively impact Baldor's sales. 3) Baldor is heavily dependent on independent distributors to sell its products. The loss of a significant number of distributors or impaired relationships with its distributors could materially reduce the firm's sales and profits. 4) Baldor possesses a substantial amount of long-term debt, which poses a risk if Baldor were unable to service this debt or meet its financial covenants. High debt levels may reduce the firm's flexibility to fund capex projects, working capital needs, or respond to changing business conditions.

ICF INTERNATIONAL (ICFI : NASDAQ : \$23.10 | BUY)

Based in Fairfax, Virginia, ICF International is a leading provider of management, technology, and policy consulting and implementation services to government, commercial, and international clients. The company's services primarily address four main areas: energy and climate change; environment and infrastructure; health, human services, and social programs; and homeland security and defense. ICF does significant business with the federal government (~60% of total fiscal 2009 revenue), as well as state and local government clients (~19% of total fiscal 2009 revenue). In addition to servicing domestic government clients, ICF services international businesses primarily in the air transportation and energy sectors (~5% of fiscal 2009 revenue) and domestic commercial customers (~16% of fiscal 2009 revenue). Founded in 1969, ICF International completed its initial public offering in October 2006. Today the company employs over 3,500 people throughout the US and in six international offices (London, Moscow, New Delhi, Rio de Janeiro, Toronto, and Beijing).

Investment thesis

ICF International is a leading consulting services firm, serving four key focus markets: energy and climate change; environment and infrastructure; health, human services and social programs; and defense and homeland security. We believe that each of these key focus areas will benefit from multiple secular growth trends, driving long-term demand for ICF's consulting services. These key trends include volatile energy prices and the need for renewable energy sources, concerns about global climate change and the potential impact to the environment, rising healthcare costs, and governments' continued focus on preventing terrorist attacks and preparing/responding more effectively to natural disasters.

We conclude that ICF's expertise and focus on energy, climate change, and environmental issues are of particular value to the government now given the spending priorities of the current presidential administration. As one of the nation's top consulting services firms to the federal government, ICF is well positioned to capitalize on this potential new business, in our view.

Investment risks

- 1) ICF International relies substantially on government clients for revenue. Changing spending priorities by governments could have a negative financial impact on the company.
- 2) The company's commercial business is heavily dependent on the air transport and energy sectors of the global economy, both of which are highly cyclical and can lead to large swings in revenue and profit from quarter to quarter.
- 3) ICF International has adopted a growth-through-acquisition strategy, which requires the company to find suitable acquisitions, pay appropriately for them, and integrate them successfully.

INTERFACE (IFSIA : NASDAQ : \$12.03 | HOLD)

Headquartered in Atlanta, Georgia, Interface Incorporated is the world's leading manufacturer of modular carpet and a leading manufacturer of broadloom carpet. The company is also a leader in "green" building and recycling, in our view, with numerous products and initiatives designed to reduce or eliminate the environmental impact associated with the manufacture of its products. Key brands include Interface, Bentley Prince Street, and InterfaceFLOR. Interface operates approximately 20 manufacturing facilities worldwide, including locations throughout the US and in Canada, Australia, England, Northern Ireland, Thailand, and the Netherlands. Interface went public in 1983 and currently has approximately 4,800 employees.

Investment thesis

As commercial designers and builders increasingly make purchasing decisions based on the economic and environmental benefits associated with "green" building, we conclude that Interface is uniquely positioned to capitalize on this important trend, given its demonstrated commitment to profitable sustainability – through the use of recycled/recyclable materials, utilization of renewable energy sources, elimination of waste, and "closing the loop" in the production process. This comprehensive approach to sustainability represents a competitive strength and basis for differentiation in the marketplace, in our view. In addition, as the leading supplier of modular carpet tile, Interface should be a prime beneficiary of the design community's continuing adoption of this type of floor covering, in our opinion.

Investment risks

1) As a supplier of floor covering products, Interface faces several important risks. First, the company's sales are strongly related to the construction and renovation of commercial and institutional buildings, which is a highly cyclical market 2) The firm relies heavily on a limited number of raw material suppliers, including Aquafill, Invista, and Universal. The loss of one of these suppliers could negatively impact the firm's business. 3) Interface has a high level of debt relative to total capital, which could limit the firm's ability to obtain additional financing to fund capex projects and/or acquisitions, and increase the firm's vulnerability to an economic downturn. 4) Interface is expanding into the residential market and therefore becomes incrementally more exposed to economic trends within that segment of the carpet industry.

LIME ENERGY (LIME : NASDAQ : \$3.35 | SPEC. BUY)

Based in Elk Grove Village, Illinois, Lime Energy is a leading provider of energy efficiency and renewable energy design/build solutions. With a national footprint consisting of 22 offices throughout the US, the company offers a comprehensive range of design/engineering/installation services that enable its customers to reduce their direct operating costs and environmental footprint. Lime's areas of expertise include energy engineering, lighting, HVAC, water, weatherization, and renewable energy. The company serves customers within two main market segments: commercial & industrial (C&I) and public sector organizations at the federal, state and local levels. Sample C&I clients include Honeywell, Sempra Energy, Johnson Controls, Frito-Lay, Lockheed Martin, and SunTrust. Sample public sector clients include the US Post Office, schools K-12, private and public universities, and the US Coast Guard.

Investment thesis

Our research leads us to conclude green building and energy efficiency are among the most significant business trends of the 21st century. Volatile energy prices, global environmental concerns, and the adoption and "mainstreaming" of green building standards are all key drivers of the green building/energy efficiency movement, in our view. With less than 2% of US office space retrofitted to improve energy efficiency, there remains a vast market opportunity for companies like Lime Energy to capitalize on in coming years.

Lime Energy represents a direct "play" on the rapidly growing trend toward energy efficiency/sustainability with the corporate and public sectors, in our opinion. As energy costs continue to rise, corporations and organizations increasingly are seeking ways to quickly and permanently reduce these costs. Lime provides the necessary consulting, energy engineering and implementation services to help its clients achieve this goal. In addition, corporations are more focused on meeting self-imposed sustainability goals, requiring a reassessment of how they operate and how much energy they consume. Similarly, public sector organizations increasingly need to meet legislated energy reduction mandates, reduce their operating budgets, and "lead by example" by greening their operations. Lime serves these needs by offering extensive technical services and delivering direct (and recurring) operating cost savings to its clients.

Investment risks

1) Customer concentration: In 2009, two clients accounted for approximately 30% of Lime's total revenue; in 2008, two clients accounted for approximately 24% of total revenue. 2) Expense structure mismatched to revenue levels: Lime has grown its operating expenses significantly in preparation for substantially higher revenue levels. If the company fails to achieve substantially higher revenue, losses are likely to continue. 3) Competitive environment expected to intensify: Given the growth and demand for energy services, competition within the space is expected to intensify as the market evolves. Key risks are greater price competition and internal competition from energy service companies, in our opinion.

LSB INDUSTRIES (LXU : NYSE : \$14.74 | HOLD)

Based in Oklahoma City, Oklahoma, LSB Industries is an industrial company with two distinct businesses: indoor climate control products and chemicals. The climate control business manufactures geothermal and water source heat pumps, and hydronic fan coils. LSB is recognized as the industry leader in geothermal technology, supplying climate control systems that heat and cool buildings in an environmentally responsible manner. Sales within the climate control business are made to mechanical contractors, original equipment manufacturers, and distributors. Climate control represented approximately 50% of total revenue in 2009. LSB Industries' chemical business is the leading supplier of nitric acid in the US and also produces ammonia and sulfuric acid. Chemical products are sold to customers in the agricultural, industrial, and mining markets. Chemical sales represented 48.5% of the company's total sales in 2009. Industrial machinery and related components accounted for the remaining 1.5% of sales last year. LSB has six HVAC manufacturing and distribution facilities in Oklahoma City and operates chemical plants in Texas, Arkansas, and Alabama. LSB Industries completed its initial public offering in 1969 and today employs approximately 1,800 people.

Investment thesis

Our research leads us to conclude that we are at the beginning stage of what is poised to be one of the most significant secular trends in the global building/construction market – the “Green Building” (GB) movement. While green building historically has represented little more than an interesting niche market driven by forward-thinking architects and builders, accelerated demand and attractive tangible returns are opening up the mainstream building industry to GB practices, in our view. We conclude that LSB Industries’ market share and brand leadership in energy-efficient geothermal heat pumps and hydronic fan coils perfectly position the company to benefit materially from this secular trend.

Meanwhile, LSB’s chemical business should benefit from two long-term industry trends that should increase global demand for nitrogen-based fertilizers: 1) rising demand for biofuels, which are derived from plants; and 2) rising worldwide demand for meat, which requires more grain to be grown as cattle feed. As a leading US supplier of fertilizers, LSB is well positioned to capitalize on these growth trends, in our view.

Investment risks

1) The cost and availability of raw materials, including anhydrous ammonia and natural gas in the chemical business, and copper and steel in the indoor climate control business. 2) The climate control business is affected by cyclical factors, particularly commercial renovation and construction. 3) Sales are largely dependent on a limited number of customers, particularly within the chemical business. 4) Environmental laws and regulations, particularly with regard to the chemical business, may subject LSB to fines or other penalties that may affect the company's ability to operate in that market.

NCI BUILDING SYSTEMS (NCS : NYSE : \$9.81 | BUY)

Headquartered in Houston, Texas, NCI Building Systems is a leading integrated manufacturer and supplier of metal coil coating services, metal building components, and engineered metal building systems. The company serves the nonresidential repair, retrofit, and new construction markets, primarily in North America. In fiscal 2009, metal coil coating represented 5% of total revenue; metal components represented 37%; and engineered building systems represented 58%. Key products within the metal components segment include pre-formed metal roof and wall systems, secondary structural members, flashings/accessories, and roll-up section doors and interior partition systems. Key products within the engineered building systems segment are engineered custom-use buildings, low-rise commercial and industrial buildings, self-storage mini-warehouses, and insulated roof and wall panels. NCI operates 32 manufacturing facilities across the United States and Mexico, and also has additional sales and distribution offices throughout the US and Canada. NCI was founded in 1984 and became listed on the NYSE in 1998.

Investment thesis

NCI Building Systems is one of the nation's largest manufacturers of engineered metal building systems and features some of the best-known brands in the industry. NCI's key advantages also include its unique vertically integrated manufacturing model and nationwide distribution network.

We view NCI as an interesting play on the steady shift toward green building practices in nonresidential construction. Representing approximately 10-12% of all new nonresidential construction projects in the US, green building represents the most significant building movement today. NCI participates in the green building market with a wide variety of "cool" metal roofs and insulated metal panels, both of which are specifically designed to enhance a building's energy efficiency. NCI's building systems are also manufactured to minimize material usage, thereby producing an attractive lifecycle analysis.

Investment risks

1) NCI is heavily dependent upon the price and supply of steel. Higher steel prices could adversely affect demand for new construction, cause supply disruptions, or lower profit margins if steel costs cannot be fully passed through to customers. Lower steel prices could cause write-downs in the value of steel held. Either scenario could negatively affect the profitability and cash flow of the company. 2) The construction industry is highly cyclical, and a decline in economic conditions could reduce demand for NCI's products and services offered. 3) In addition to these risk factors, we recommend that investors look at the complete list of risk factors that can be found in the most recent SEC filing.

ORION ENERGY SYSTEMS (OESX : NASDAQ : \$3.01 | BUY)

Based in Manitowoc, Wisconsin, Orion Energy Systems is a supplier of energy management systems that consist primarily of high-performance, energy efficient lighting systems, controls, and related services. The company's high-intensity fluorescent (HIF) lighting systems are primarily sold into the commercial and industrial building markets, including warehouses, distribution centers, and manufacturing operations. Orion's HIF systems typically reduce customers' lighting-related electricity costs by approximately 50% while increasing their quantity of light by approximately 50% and improving overall lighting quality. Orion has sold and installed its high-performance HIF lighting systems in more than 5,600 commercial and industrial facilities across North America, including installations for dozens of Fortune 500 companies. In addition to its HIF systems, Orion provides energy management services, including comprehensive site assessment, site field verification, utility incentive and government subsidy management, engineering design, project management, installation services, and recycling (of used lighting fixtures) in connection with its retrofit installations. Orion began operations in April 1996 and completed its initial public offering on December 19, 2007.

Investment thesis

We conclude that Orion provides investors with an opportunity to participate in the rapidly growing green building market. Orion's energy management systems provide a unique and comprehensive solution to reduce customers' lighting-related electricity costs, while also permanently reducing base and peak load electricity demand from utilities.

Orion estimates its HIF lighting systems reduce lighting-related electricity costs by 50% compared to traditional HID fixtures, while increasing the quantity of light by 50% and improving lighting quality. Because Orion's systems permanently reduce electricity consumption in buildings, the company provides significant environmental benefits through the reduction of CO₂ emissions. As green building continues to gain momentum, we anticipate Orion will be a prime beneficiary given the high (and rising) cost of electricity and the associated environmental benefits of its systems that minimize electricity consumption. Our positive outlook is based on Orion leveraging its strong existing customer base, gaining new customers, increasing marketing efforts directly to utilities, and introducing new products.

Investment risks

1) Orion faces numerous competitors, many of which are larger, better capitalized, and have greater engineering and manufacturing capabilities. 2) Orion's business is dependent upon its customers' desire to replace their existing lighting systems. Decisions to retrofit existing buildings are influenced by the strength of the general economy, the size of customers' capital budgets, and overall trends within the commercial building/refurbishment markets. 3) Orion's products use components and raw materials that are subject to potentially significant price fluctuations.

REAL GOODS SOLAR (RSOL : NASDAQ : \$2.80 | SPEC. BUY)

Headquartered in Hopland, California, Real Goods Solar is a leading residential solar energy integrator. The company provides turnkey services to its solar energy system customers, including design, procurement, permitting, build-out, grid connection, and financing referrals. Real Goods Solar claims to have installed more residential solar energy systems in the US than any other company, including more than 2,400 residential and small commercial solar energy systems over the past 30 years. The firm purchases solar photovoltaic (PV) modules, inverters, and other components from leading manufacturers, such as Sharp, SunPower, and Kyocera Solar, among others. As of the end of 2007, Real Goods Solar was one of the top three solar energy system installers in California and a leading installer in Colorado. A subsidiary of Gaiam, Inc., Real Goods Solar went public in May 2008, offering 5.5 million shares at \$10/share. The company currently has approximately 87 employees, including installation personnel.

Investment thesis

As the first mover in the highly fragmented residential solar energy integrator market, Real Goods Solar has built the industry's leading brand, in our view. The company has more than 30 years experience installing solar systems, with more than 2,400 systems installed and a catalog customer base of 30,000-plus. Importantly, we expect that Real Goods Solar can continue to leverage the eight million environmentally aware ("ecoconscious") customers of its parent company, Gaiam Inc.

We conclude that PV (photovoltaic) industry demand fundamentals are positive and will benefit the company over the long term. Solar energy systems continue to experience rapid global adoption, driven by high energy prices, environmental concerns, energy security needs, and various governmental incentives. As new silicon supply comes on line and competition drives down solar cell/module pricing, we conclude that systems integrators such as Real Goods Solar will capitalize on strong market demand resulting from substantial price declines.

Currently, there is no national, or even regional, solar systems integrator. Given the strong growth potential projected for PV products, we conclude that a systems integrator with national reach is desirable. We believe that Real Goods Solar has the potential to become such a company and will continue to consolidate the industry, first in California and Colorado, but later to a more national footprint.

Investment risks

- 1) The solar market is dependent on the availability of government subsidies and incentives to support its development.
- 2) Solar energy faces competition from other renewable energy sources, such as wind, hydroelectric, geothermal, concentrated solar, and biomass.
- 3) Growing adoption of solar energy is dependent upon the retail price of conventional energy. If conventional energy costs remain flat or fall, adoption of solar energy systems could decline.
- 4) Real Goods Solar is dependent upon solar energy installations in only two states: California and Colorado.
- 5) The company's growth is dependent upon its ability to make and integrate suitable acquisitions.

TREX COMPANY (TREX : NYSE : \$21.86 | HOLD)

Trex Company is one of the largest manufacturers of non-wood alternative decking, railing, fencing and trim products in the US. The company's primary products, sold under the Trex brand name, are a wood/plastic composite manufactured using a proprietary process that combines waste wood fibers and reclaimed polyethylene (primarily plastic grocery bags and plastic pallet wrap). Trex Wood-Polymer lumber is a wood/plastic composite that offers an attractive appearance and the workability of wood without wood's ongoing maintenance requirements or functional disadvantages. The company sells through a large network of wholesale distributors, which in turn sell Trex products to approximately more than 3,000 retail stores across the US and Canada. Trex operates manufacturing facilities in Winchester, Virginia and Fernley, Nevada. A former spin-out of Mobil Corporation, Trex completed its initial public offering in April 1999.

Investment thesis

Trex is a leading manufacturer of composite decking and railing products in the US. On a longer-term basis, we believe the prospects for the composite wood market are attractive, as the material provides numerous advantages over lumber. We conclude these advantages should enable composite wood to continue to capture incremental market share from various markets traditionally served by lumber, including decking, railing, and fencing. Moreover, Trex's growth initiatives, such as the launch of an ultra-low maintenance decking product (Transcend), increased penetration at "Big Box" stores such as Home Depot, and the rollout of its composite fencing product, hold attractive long-term growth potential, in our view.

Investment risks

As a supplier of alternative wood decking and railing products, Trex faces several important risks: 1) The company is dependent on consumer demand for alternative decking materials, which is a highly competitive market attracting new entrants given its projected growth dynamics; 2) Trex is subject to swings in commodity pricing, particularly for reclaimed polyethylene, which can negatively affect margins during periods of rising prices; and 3) Trex has limited control over potential inventory buildups in the distribution channel, as the firm sells to wholesale distributors who in turn sell to local lumberyards.

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(as of 2 July 2010)

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	#	%	
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	695	100.0%	

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