McGraw Hill CONSTRUCTION

outlook 09 Industry Forecast and Trends

Green Outlook 2009

Trends Driving Change

connecting people_projects_products

Preface

Letter from Norbert W. Young, Jr., FAIA, President, McGraw-Hill Construction
and Harvey M. Bernstein, F.ASCE, LEED AP, Vice President,
Industry Analytics, Alliances & Strategic Initiatives, McGraw-Hill Construction

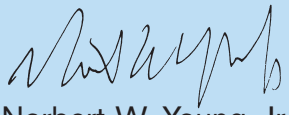
Once an emerging trend, green building has become a growing part of today's construction industry. With the down market, it has become even more important for industry players to capture the opportunity created by the demand for more sustainable buildings. As a result, we have put together this Green Outlook report which provides you with rich intelligence about sustainable design and construction—a market that is ever growing and one firms will need to understand moving forward.

By 2013, we estimate today's overall green building market to more than double, reaching between $96 -$140 billion versus $36-$49 billion today for residential and nonresidential buildings. This figure shows a dramatic growth rate for the green marketplace of today, which as already seen some dramatic growth as reported in our previous green SmartMarket Reports. Knowing where and how to take advantage of this growing opportunity is a key driver for success in today's industry. Using McGraw-Hill Construction's proprietary information and data—including the McGraw-Hill Construction Network, built on the Dodge project database; 60,000 annual digitized plans and specifications; five year construction market forecasts; proprietary market research of a representative sample of the construction industry (some of which can be found in our SmartMarket Reports) and review of other market indicators—the results in this report provide answers on the current state of sustainability as well as where it is headed. You will learn why sustainability is one of the true bright spots in this down economy and why it is important to your firm's growth.

Aside from market size estimates, you will learn about the business benefits from green which are rapidly increasing, how green is growing in terms of its reference in project plans and specs, how mainstream awareness and incentives are accelerating the growth of sustainable design and construction, and how owners and corporate executives are helping to drive this acceleration as they consider rising energy costs, increasing government regulations, additional financial and tax incentives, and more pressure from global competition. All of this intelligence helps you to understand the underpinnings of this market so you can navigate its waters successfully.

Our staff of researchers, economists and analysts—including those LEED Accredited Professionals on the staff with green building expertise—have created all the reports that are part of our expanded Outlook this year, which includes our Construction Outlook, the industry's premier forecast for the year ahead, and The Outlook 2009 Products and Players' Trends, a new report focusing on trends of industry player activity and product specification. Our studies are based on primary research coupled with the intelligence we derive from our proprietary McGraw-Hill Construction Network project database of more that 600,000 active projects, and history going back more than 30 years. We hope you enjoy this, our first Green Outlook report, and that it becomes a valuable part of informing your business.

As always,



Norbert W. Young, Jr., FAIA
President
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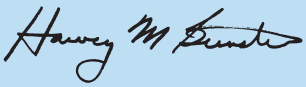


Harvey M. Bernstein, F.ASCE, LEED AP
Vice President,
Industry Analytics, Alliances & Strategic Initiatives
McGraw-Hill Construction

As always, we welcome your feedback. Please contact us at 800-591-4462 or via email at MHC_Analytics@mcgraw-hill.com to let us know what you found particularly valuable and what additional information would be of interest to you. It will help us to create an even more targeted report in future years. You can also find other green building intelligence in our Green Building SmartMarket™ Reports, and the aforementioned 2009 Construction Outlook and 2009 Outlook Products and Players' Trends report by visiting www.construction.com/market_research.

Contents

Green Building Market Size and Estimate

In 2005, green building was a small, burgeoning market, approximately 2% of both nonresidential (commercial and institutional) and residential construction, valued at a total $10 billion–$3 billion for nonresidential and $7 billion for nonresidential. Since that time, green building has expanded rapidly due to a number of factors such as growing public awareness of green practices, heavy increase in government interventions (see page 35 for details), and recognition by owners of the bottom line advantages (see page 9 for details).

In fact, green building has grown in spite of the market downturn. Green seems to be one area of construction insulated by the downturn, and we expect green building will continue to grow over the next five years despite negative market conditions **to be a $96-$140 billion market.**

Nonresidential Construction

Based on McGraw-Hill Construction's Network Dodge data, Construction Outlook forecast and analysis of the economy and other trends, **MHC estimates the 2008 commercial and institutional green building market size will be 10% to 12% of new starts by value. This equates to a $24–$29 billion marketplace.**

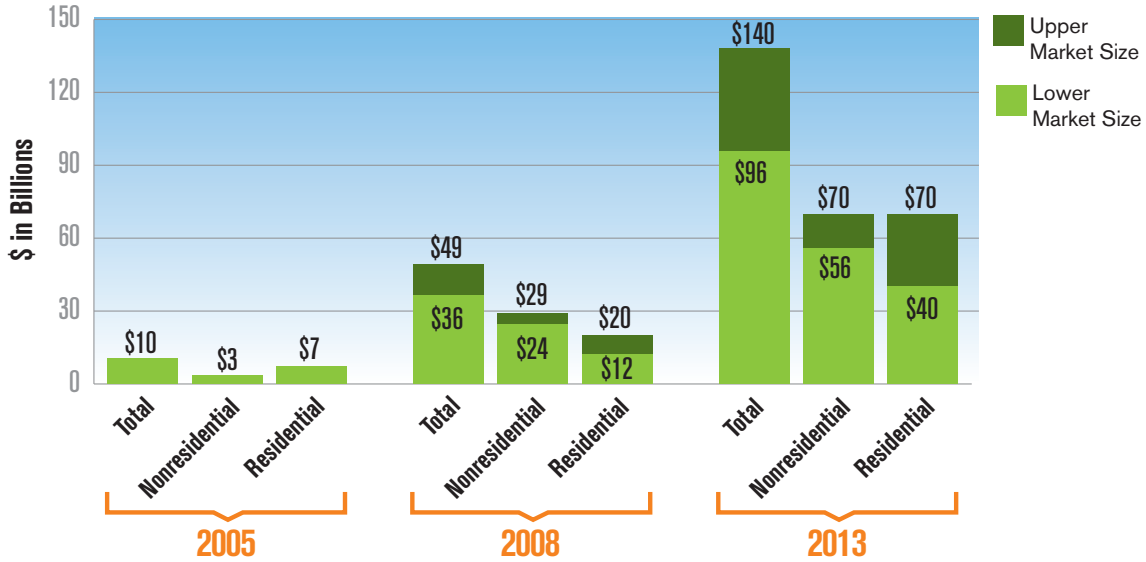
Growth is expected to continue to expand. **By 2013, MHC projects that the commercial and institutional green building market will be 20% to 25% of new construction starts by value. This would equate to $56–$70 billion** based on McGraw-Hill Construction's five-year construction market forecast.

Residential Construction

Residential green building growth is also expected to grow. MHC estimates the **2008 residential green building market size will be 6% to 10% of new starts by value. This equates to a $12–$20 billion marketplace in 2008.**

Green building growth is expected to continue to increase, though less aggressively than in nonresidential construction. **By 2013, MHC projects the residential green building market to be 12% to 20% of new construction starts by value. This would equate to $40–$70 billion** based on McGraw-Hill Construction's five-year construction market forecast.

Nonresidential and Residential Green Home Market Opportunity



Source: Based on MHC construction market forecast, McGraw-Hill Construction Dodge Project data, and substantiated by surveys conducted by McGraw-Hill Construction between 2006 & 2008. Building codes, legislation and policies were also used in determining market estimates. *Green buildings are defined as one built to LEED standards, an equivalent green building program or one that incorporates numerous green building elements across five category areas: energy efficiency, water efficiency, resource conservation, responsible site management/construction and improved indoor air quality. Projects that only featured a few green building products (e.g., HVAC systems, waterless urinals) or that only addressed one aspect of green building, such as energy efficiency were not included in this calculation.

Key Market Intelligence

- **The industry sectors with the highest penetration of green building are education, office and healthcare. This bodes well for green growth since these sectors represent the highest share of nonresidential construction overall (as can be seen on the chart on page 5).**
  - **Education: Green building activity expected to be valued between $8 and $11 billion.**
  - **Office: Expected market value of $7-$9 billion.**
  - **Healthcare: Expected market value of $3-$4 billion.**
- **Green building is expanding in every region, though some noteworthy findings are:**
  - **Nonresidential: Heavy concentration of green building activity in the Mid-Atlantic, likely due to the number of government-owned buildings in this region.**
  - **Residential: Strongest activity is occurring in the Pacific coast followed by activity in the South Atlantic and Mountain.**
- **The largest nonresidential projects by size are going green. See details and chart on page 8.**

Overall Market Opportunity

Nonresidential Construction

The 2008 projection for green building of 10%–12% is higher than the 5%–10% market share estimated by MHC in 2005. In part what accounted for the rapid expansion between 2005 and 2008 has been the significant increase of government requirements and policies encouraging green building, such as the legislation in Ohio and Washington State that require all public schools be built green. Further, increased attention on sustainability and green in the media makes building green more attractive to corporate leaders and commercial building owners who want to capture positive public attention.

The nonresidential construction market is expected to stay fairly consistent through 2013. As a result, we expect that the commercial and institutional market will provide ample opportunity for green building to continue to thrive. For sector breakouts, see pages 16 through 21.

Residential Construction

In 2005, information pointed to a green residential market size of 2%, valuing $7 billion in that residential market. Despite the downturn, indicators point to an increased share of new homes containing green features. As a result, growth is expected, though at a slower pace than nonresidential buildings.

The housing slump is expected to reach bottom in 2009-2010 before starting to increase again. This provides further opportunity for green builders to capitalize on the market advantage green has offered to home builders (see page 4).

Influence of the Current Down Market

Green building seems to be somewhat insulated by the construction market downturn. Much of this has been attributed to the market differentiation posed by green building.

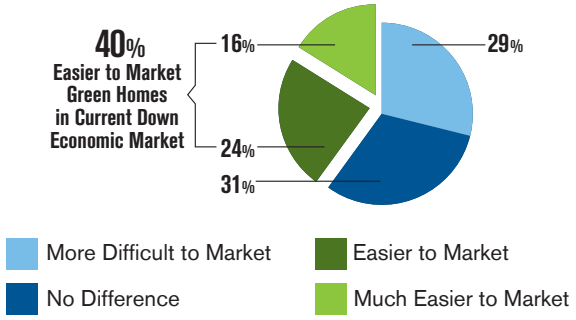
Residential Building

Residential builders in particular see advantages posed by green building as a differentiator. Many builders report that the green market has buffered them from the slump. As stated in MHC's *The Green Builder SmartMarket Report* (2008), 40% of builders report a marketing advantage from green homes in today's housing slump, with 16% finding a much easier time of selling these homes.

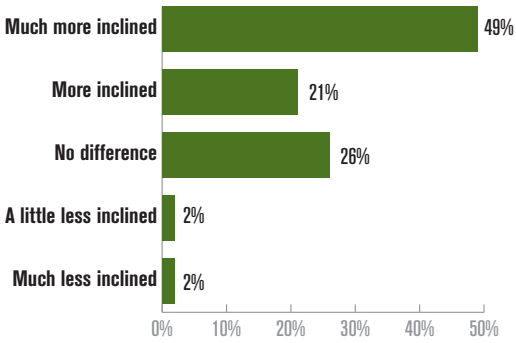
In spite of the roller coaster nature in this down economy, features that lead to decreases in operation and maintenance costs are likely to be a selling point for consumers, and green homes can offer that advantage. Consumers are confirming this as 70% of them report they would be more inclined to purchase a green home in a down market.

Residential Construction

Ease of Marketing Green Homes in Down Market



Impact of the Down Economy on Green Home Consumers



Source: *The Green Home Consumer: Driving Demand for Green Homes SmartMarket Report*, McGraw-Hill Construction, 2008.

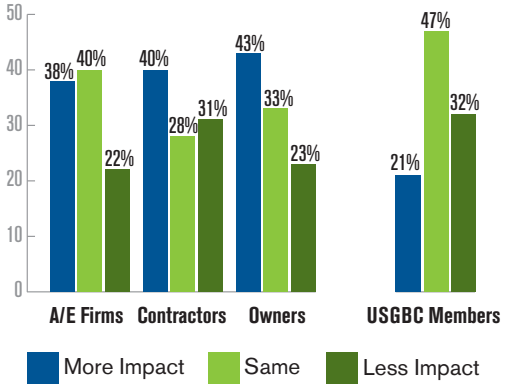
Nonresidential Construction

There is more conservative opinion with respect to the affect of the down market. As reported in the MHC *Commercial and Institutional Green Building SmartMarket Report* (2008), industry players in the nonresidential building market report more often that the market affects green building more compared to those that think it is *less affected* (see chart bottom right). This is countered by USGBC members who believe nearly the opposite—32% believe green building is *less affected* by the downturn compared to 21% who believe it is more affected.

This actually bodes well for green building. USGBC membership can be taken as an indicator of high level of green building involvement. What this suggests is that as industry players get involved, they are seeing paybacks from green.

Nonresidential Construction

Impact of Down Economy on Green vs. Non-Green Construction



Source: *Commercial and Institutional SmartMarket Report*, McGraw-Hill Construction, 2008

Nonresidential Construction Market Sector Activity

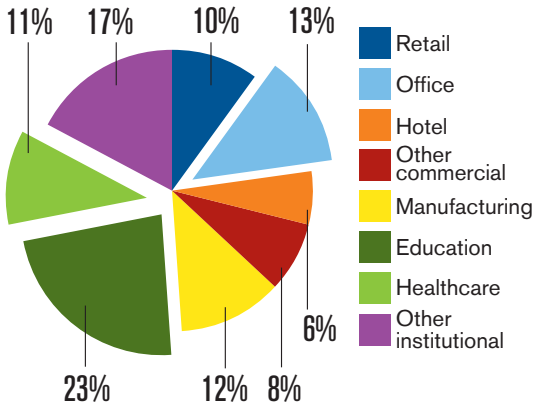
McGraw-Hill Construction

U.S. Construction Starts (Billions of Dollars)

				Forecast	
	2005	2006	2007	2008	2009
Nonresidential	183	217	234	244	220
%Chg	*11%*	*19%*	*7%*	*4%*	*-10%*
Commercial & Industrial	82	106	117	119	99
%Chg	*9%*	*29%*	*9%*	*2%*	*-17%*
Institutional	100	111	116	124	121
%Chg	*12%*	*10%*	*5%*	*7%*	*-2%*

Source: McGraw-Hill Construction, Construction Outlook 2009, as of October 2008

Nonresidential Construction Starts by Value



Source: McGraw-Hill Construction, Construction Outlook 2009, as of October 2008

Education

The government has been particularly active in green building policies that relate to projects with public funding. Legislation is becoming common that mandates schools be built green—such as Ohio and Washington State. Other states, like California and Pennsylvania, offer financial benefits to schools. In today's economy, these can be very attractive to school districts.

The green building share of education construction in 2008 is expected to be higher than average, comprising 10% to 15% of the market by value, or $8-$11 billion. MHC expects this market to grow and reach up to 30% in five years.

With Education being the largest nonresidential construction sector by value (see above right), growth of green in this sector poses great opportunity for industry players seeking business in this market. The industry is confirming this supposition. A/E firms and contractors both report the heaviest levels of their green building work is in the education construction sector.

What is also important in the education market is the high level of mention of green in MHC's digitized project specifications (see pages 25 to 32). This suggests that not only are buildings being built green, but specifiers are being explicit about their adoption of different types of green products and strategies in the planning stages. This will help industry players like architects and product manufacturers track the most dominant green building needs.

Healthcare

Healthcare is a burgeoning market for green building. The recent embrace of green building may be due to the large size of healthcare projects and the particular attractiveness of the benefits posed by green building—such as improved health, increased staff productivity and reduced energy bills. According to the U.S. Energy Information Administration, healthcare's energy use per square foot is 190,000 Btu, double that of buildings overall.

The value of healthcare green building in 2008 project starts is estimated to be approximately $3-$4 billion. MHC expects moderate increase in this market, slightly above average. This again creates significant market opportunity for industry players, since healthcare is the third largest nonbuilding construction sector by value (11%). Further, despite slight decreases in 2009 the outlook for healthcare construction is relatively healthy over the subsequent four years.

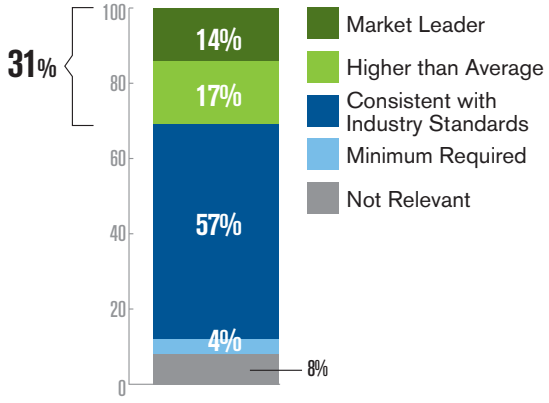
Office Building

Office buildings are another very strong market for green building. Owners are seeing increased advantage of going green. According to MHC's *Greening of Corporate America SmartMarket Report* (2007), 31% of corporate leaders have a higher than average vision for corporate sustainability by 2010, and 43% see green as a growth strategy. Additionally, 38% find green building "very important" compared to 21% who find it unimportant.

The embrace of green building by these big corporations may explain the size of green in office buildings. The value of green building in the office sector is expected to be approximately $7-$9 billion in 2008. Steady growth of this market is expected over the next five years. In fact, MHC expects it to be higher than average, second behind education.

With office being the second highest nonresidential construction sector by value (see page 5), once again, this offers a high level of market opportunity. However, the credit crunch may make financing for large construction projects to be delayed. Since these projects are more likely to be built green than smaller ones, the green office market may grow at a slightly lower rate than other sectors in the short term.

Vision for Corporate Sustainability from 2006 to 2008 according to Corporate Senior Executives



Source: *The Greening of Corporate America SmartMarket Report*, McGraw-Hill Construction/Siemens, 2007

Other Commercial Buildings

The retail and hotel markets have had much less penetration of green building compared to the other nonresidential building sectors. Much of this is likely due to these owners having less direct control over the operating cost advantages of green building. For example, retail owners often sublet their space so do not have direct control on energy use. Similarly, the energy use habits of guests do not enable hotel owners to necessarily judge the paybacks green building would offer them. Additionally, the occupants of these buildings—like store employees, shoppers and travelers—are not in the space for long enough periods to measure productivity benefits.

What would spur faster adoption in these sectors would be a consumer push for green. If these owners can maximize on the publicity benefits of green, and feel they can garner increased rents, they will start to adopt green building more fully.

The exception to this has been some big box retailers like Wal-Mart. Wal-Mart's widespread adoption of green building elements into their store designs is an example that the industry may want to use when they are looking for specific owners open to green building products and expertise.

Also, USGBC reports commitments by more than ten national retailers to build LEED into their standard design/construction specifications. This suggests the share of green building in retail may grow more rapidly than expected.

Regional Activity

Green building is becoming widespread with activity expected in most areas of the U.S. An indicator of widespread adoption of green building is the proliferation of government policies that have emerged since 2005 (see page 35 for more details). There are some noteworthy higher levels of regional green building activity.

Nonresidential Buildings

In nonresidential buildings, policies have been more concentrated on the West and East coasts. MHC's plans and specs confirm this. As can be seen on page 27, the heaviest mention of LEED in project specs is occurring in the Mid-Atlantic and Pacific Northwest regions. Furthermore, USGBC's LEED registered projects through October 1, 2008, show the greatest share of green construction to be in Washington, DC (though California has the largest number of projects overall; its percent of green work is much smaller than that in Washington, D.C.)

Again, this supports the supposition that government policies are encouraging green building.

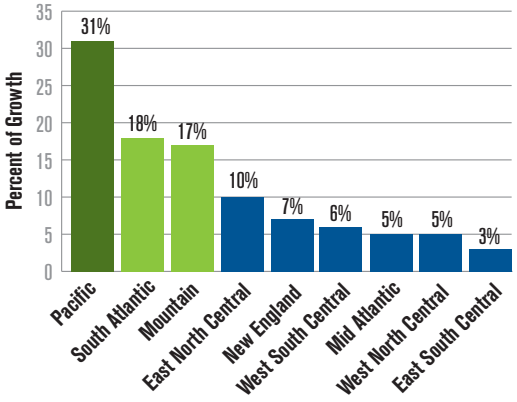
Residential Construction

As reported in MHC's *The Green Home Builder SmartMarket Report*, builders perceive the greatest potential for green building growth in the Pacific, followed by the South Atlantic and Mountain regions (see below).

As can be seen in the chart far below, green homeowners are more likely to be buying in the South and West regions. This is somewhat consistent with where builder activity is taking place.

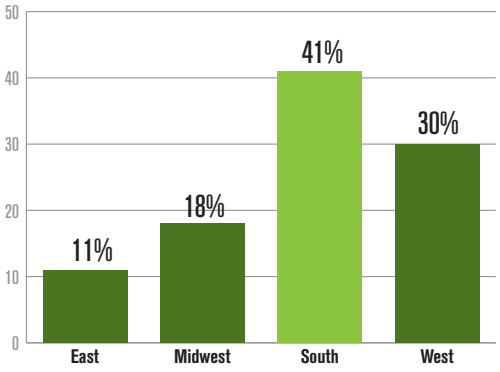
Residential Construction

Region with Best Growth in Green Building according to Home Builders



Source: *The Green Home Builder SmartMarket Report*, McGraw-Hill Construction, 2008

Region of the Green Home Consumer



Source: *The Green Home Consumer: Driving Demand for Green Homes SmartMarket Report*, McGraw-Hill Construction, 2008.

Green in the Largest Projects by Value

Another significant driver to the growth of green building has been the integration of green into design of the largest construction projects by value.

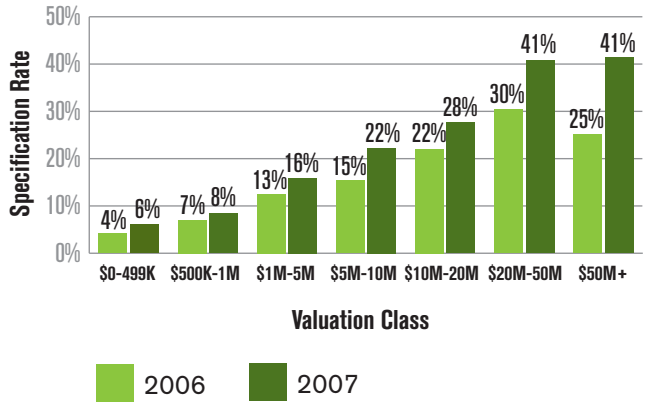
The chart at right shows how mention of LEED grew in higher valued projects between 2006 and 2007, where the biggest increases occurred in projects over $20 million.

Additionally, according to MHC's Network Dodge data, the highest valued projects starting in 2008 are embracing green building.

The data reveal:

- **Education: 42% of project starts in 2008 that are over $186 million are also green.**
- **Healthcare: 22% of project starts in 2008 that are over $125 million are also green. There is even heavier concentration when looking at the top ten of these projects—half are green.**
- **Office: An overwhelming 64% of project starts in 2008 that are over $125 million are also green.**

Incidence of LEED in Project Specification by Valuation Class from 2006 to 2007



Source: *Products and Players' Trends*, McGraw-Hill Construction, 2008

The Business of Green Building

Economic incentives are driving green building. Fortunately, the industry is becoming much better at measuring the paybacks from greening their buildings. In just three years, industry players in the nonresidential and residential construction sectors are reporting higher levels of paybacks from green building. The entire nonresidential community expects green buildings to directly contribute to the bottom line.

Key Market Intelligence

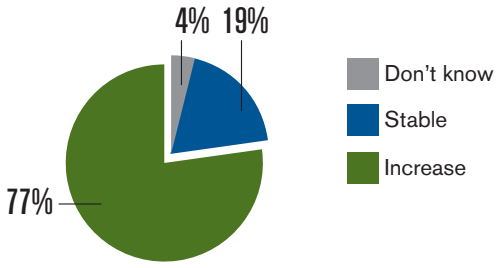
- **Nonresidential Industry Players:**
  - Difference in opinion on **decreased operating costs from 2005 to 2008 increased 60%** (for a total increase of 4.6 to 5.6 percentage points).
  - Perception of **increased building values rose 45%** (3.4 percentage points)
  - Perception of **increased ROI rose 50%** (3.3 percentage points)
  - Perception of **increased building occupancy rose 83%** (3.1 percentage points)
  - Perception of **increased rents doubled** (3.1 percentage points)
  - 77% perceive **higher revenues from green** (see pie chart at right).
  - 61% perceive **profit levels will be average or higher from green.**
- Green home buyers: **18% decreases in energy and water bills** (see page 11).
- Global players: **86% perceive higher revenues from green** (see page 15).

Perceived Benefits of Nonresidential Green Building over Time according to Overall AEC/O Community

	2005	2008
▪ Decreased Operating Costs	8-9%	13.6%
▪ Increased Building Values	7.5%	10.9%
▪ Improvement in ROI	6.6%	9.9%
▪ Increased Occupancy	3.5%	6.4%
▪ Rent Rise	3.0%	6.1%

Source: McGraw-Hill Construction, 2008

Sales Growth Associated with Nonresidential Green Building in the Short Term
according to Total AEC/O Community



Source: *Commercial and Institutional SmartMarket Report*, McGraw-Hill Construction, 2008.

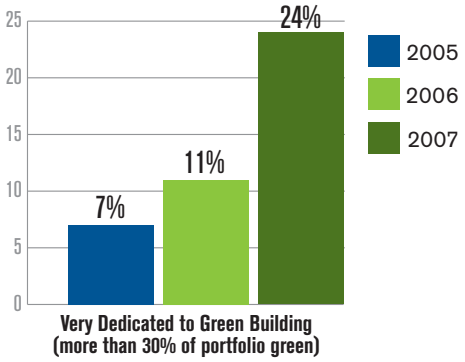
Benefits of Green Building

As discussed on pages 2 to 8, the market size and industry player involvement in green building is increasing for all industry players as well as homeowners.

In particular, nearly a quarter of corporate America reports that more than 30% of their building stock is being built green. These corporate leaders expect green building will serve the financial performance of their companies (see chart below right).

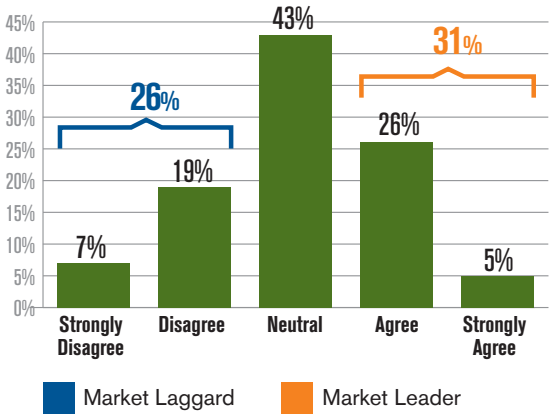
The benefits reported by these corporate leaders will inevitably help motivate the market and lead to increased levels of green buildings overall.

Increase in Corporate America Green Building Leaders Over Time



Source: *The Greening of Corporate America SmartMarket Report*, McGraw-Hill Construction/Siemens, 2007

Corporate Perception Whether Green Building Will Serve the Financial Performance of Company



Source: *The Greening of Corporate America SmartMarket Report*, McGraw-Hill Construction/Siemens, 2007

Nonresidential Buildings

Architects, engineers, contractors and owners (AEC/O) are all reporting increases in bottom line performances, as can be seen in the chart on page 9.

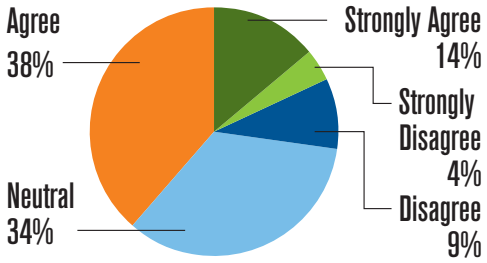
In addition to that, senior leaders of corporate America responsible for large portfolios of properties are reporting many advantages of green building.

Some of their reported advantages include:

- 31% perceive green buildings serve their bottom lines.
- 52% believe that green building provides them with market differentiation. CEOs report at even higher levels—63% believe in this benefit.
- 58% perceive lower operating costs from green building.
- 57% believe green building fosters innovation.
- 44% think green building will help them retain and attract talent.

Source: *Greening of Corporate America SmartMarket Report*, McGraw-Hill Construction/Siemens (2007)

Perception Whether Green Building Provides Opportunity for Market Differentiation according to Corporate America



Source: *The Greening of Corporate America SmartMarket Report*, McGraw-Hill Construction/Siemens, 2007

Other advantages reported by various types of owners and industry players can be seen in the chart below.

Industry Player	Business Benefits from Green Building	
Global Construction Players	▪ **56%** report rapid growth	▪ **86%** report growth
Corporate Leaders	▪ Market Differentiation →	**52%** think green provides market differentiation
	▪ Operating Cost Decrease →	**58%** report expectation of lower operating costs
	▪ Innovation →	**57%** think green fosters innovation
	▪ Financial Performance Impact →	**31%** believe green contributes to the bottom line
School Administrators and Facility Managers	▪ Operating Cost Decrease →	**11%**
	▪ Building Value Increase →	**6%**
	▪ Energy Cost Savings →	**14%**
Healthcare Owners	▪ Energy Cost Savings →	**10%**
	▪ Patient Recovery Rates →	**47%** report expectation of faster recovery rates; **8%** report faster recovery
Homeowners	▪ Energy Costs Savings →	**18%**
	▪ Water Bill Savings →	**18%**

Source: *Global Green Building Trends SmartMarket Report*, McGraw-Hill Construction (2008); *The Greening of Corporate America SmartMarket Report*, McGraw-Hill Construction, 2007; *Education Green Building SmartMarket Report*, McGraw-Hill Construction, 2007; *Healthcare Green Building SmartMarket Report*, McGraw-Hill Construction, 2007; *The Green Home Consumer SmartMarket Report*, 2008.

Residential

Builders need to know the paybacks of homes in order to use it as a selling point for potential homebuyers, since a key factor to paying a premium for these homes will be data on possible reduced operational costs.

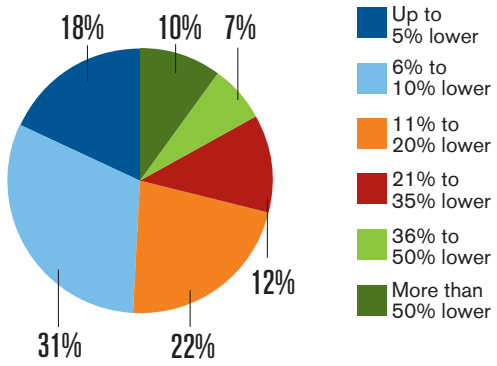
According to the results of the recent survey sponsored by MHC and USGBC presented in MHC's *The Green Consumer SmartMarket Report* (2008), on average, green homeowners are seeing an 18% reduction in both their energy bills and water bills in their new green home.

Factors Increasing Demand

Some of this demand is being driven by the next generation. According to a report in BusinessWeek, members of the "millennial" generation are becoming more socially conscious:

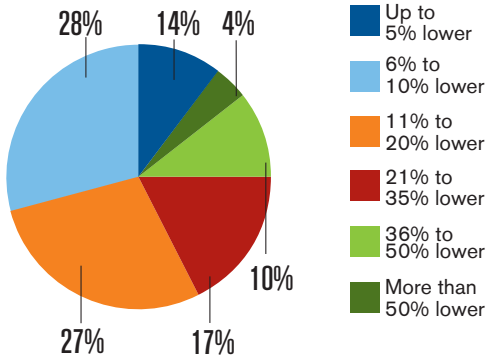
- 89% are likely to switch brands to support a cause.
- 74% are more likely to pat attention to messages of companies deeply committed to a cause.
- 69% consider a company's social commitment when deciding where to shop.
- 66% consider a company's social commitment when recommending products.

Reduction in Water Bills from Green Home according to Green Homeowners



Source: *The Green Home Consumer: Driving Demand for Green Homes SmartMarket Report*, McGraw-Hill Construction, 2008.

Reduction in Energy Bills from Green Home according to Green Homeowners



Source: *The Green Home Consumer: Driving Demand for Green Homes SmartMarket Report*, McGraw-Hill Construction, 2008.

Making the Business Case

Across the board, the industry is motivated by the business advantages of green building. Therefore, it is critical that firms hoping to gain share of the rising green building market use business evidence in convincing their clients to go green. In particular, the commercial sector, that currently has fewer government regulations and mandates requiring building green, will want evidence on the paybacks of green.

Owners' Top Drivers and Motives to Green Building:

- **Corporate America Senior Executives:** Driven by rising energy costs, increasing government regulations, additional financial and tax incentives, and more pressure from global competition.
- **Healthcare and School Owners:** Motivated by reduced operating costs, improved health and well-being and lower energy use.
- **Home Buyers:** Motivated by operational cost and health savings.

Other studies confirm MHC's findings, including the following:

- U.S. Department of Energy: Green buildings lead to:
  - **Reduced energy use by 30%-50%**
  - **Reduced waste output by 70%**
  - **Reduced water use by 40%**
  - **Reduced carbon dioxide emission by 35%.**
- Kador Group's 500 Collins Street Green Renovation Productivity Study: Results of one tenant saw
  - **Reduced average sick days by 39%**
  - **Lower monthly health care costs among staff by 44%**
  - **Increased billable hours by 7%**
  - **Improved typing performance by 49%.**

Green Jobs

Green jobs emerged as a widely used term in 2007, with politicians and the industry starting to measure and calculate how these jobs could help tackle increasing unemployment numbers. Some also see these new jobs as helping to create jobs for returning members of the U.S. military and for underserved minority communities.

Green jobs can comprise any job that is related to the renewable energy and energy-efficient industries. The jobs can be as diverse as those in manufacturing, construction, accounting and management.

The U.S. government is starting to take notice of green jobs as a solution. Legislators are proposing plans to increase these jobs as are the plans of President-Elect Obama. Examples include the Green Jobs Act, introduced in Congress in 2007, and the $100 million in training for green-collar jobs included in the Energy Savings Act of 2007.

The numbers by think tanks and industry groups have been impressive about the opportunities that could be posed by green jobs:

- American Solar Energy Society calculates **there could be 40 million new green collar jobs by 2030.**
- The Center on Wisconsin Strategy, Workforce Alliance and The Apollo Alliance estimate that **in order to stabilize carbon emission levels, the added renewable energy needs could lead to 400,000 domestic jobs in wind power jobs.**
- **City of Chicago reports that their climate action plan could create 5,000-10,000 green jobs annually.**

Some education programs are already emerging across the U.S. A sampling of these efforts include:

- **Chicago, Illinois:** "Green Corps Chicago" is one of the older green-collar training programs in the country.
- **Washington, D.C.:** "Green Jobs Advisory Council" created by Mayor Fenty to help city agencies develop green jobs training policies.
- **Baltimore, Maryland:** Civic Works trains youth in green construction and weatherization programs, and has worked to install cool roofing for homes in Baltimore.
- **Richmond, California:** Job training program on green jobs called Richmond BUILD oriented toward training low-income residents and minority youths.
- **Wisconsin:** Regional Training Partnership has built industry relationships to help facilitate the creation of green jobs.

Involvement in Green Building

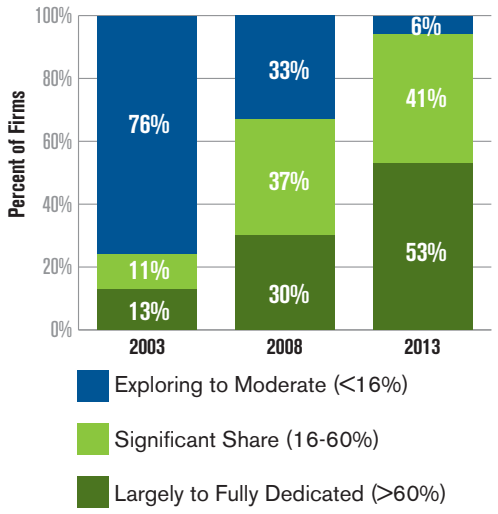
The construction industry is becoming more involved in green building over time. From early adopters in the global construction marketplace to overall industry players in institutional and commercial building owners and home builders, the rapid interest and reported involvement in green building is increasing over time.

The following pages provide market summaries by different sectors. The information can help the industry gauge different aspects of these markets with a snapshot of their involvement in green building.

Key Intelligence

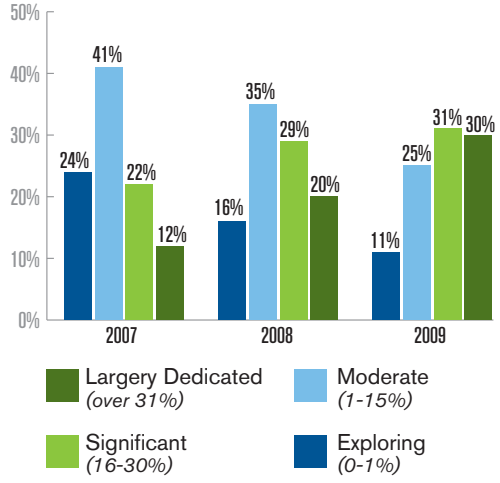
- Global: **Early adopters are deeply involved in green, with 30% building green on over 60% of their projects in 2008.** Over the next five years, more than half (53%) expect to reach this level of involvement.
- Nonresidential Buildings: Industry Players in commercial and institutional buildings are getting increasingly active in green building, with those **largely dedicated to green building (30% or more of their projects built green) reporting a 50% increase** (10 percentage points) from 20% in 2008 to 30% in 2009 (see below left).
- Residential Home Builders: **Builders heavily involved in green building (60% or more projects green) is expected to also increase** from 26% in 2008 to 36% in 2009 (see below right).

Global Level of Firm Involvement Over Time



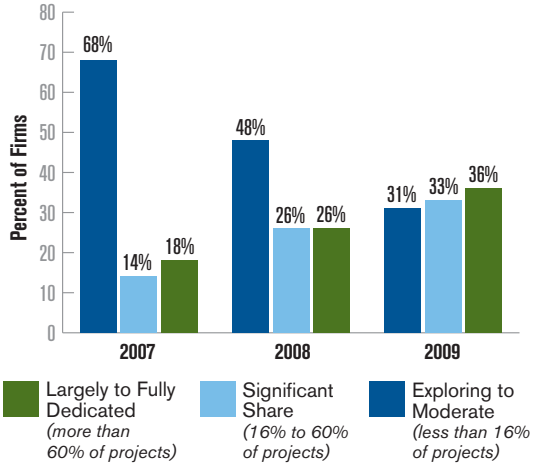
Source: *Global Green Building Trends SmartMarket Report*, McGraw-Hill Construction, 2008

Nonresidential Construction Involvement in Green Building over Time according to AEC/O Firms



Source: *Commercial and Institutional Green Building SmartMarket Report*, McGraw-Hill Construction, 2008

Residential Involvement in Green Building over Time according to Home Builders



Source: *The Green Home Builder SmartMarket Report*, McGraw-Hill Construction, 2008

Global Green Building

Green building has become a global phenomenon, with active growth occurring in every region of the world. According to a MHC survey of early market adopters in 45 countries, market activity is gaining rapid momentum as the industry awakens to the benefits of building green.

Global Green Building Market Opportunity

In today's $4.7 trillion global construction marketplace, green building represents a tremendous market opportunity. MHC research shows that green represents a growing share of this activity, with a majority (63%) of industry professionals estimating that green makes up at least 5% of domestic output in their country (see chart at right).

Green Building Market Involvement

Firm-level dedication to green is growing dramatically in every region. According to results reported in MHC's *Global Green Building Trends SmartMarket Report* (2008):

Highest Levels of Market Activity

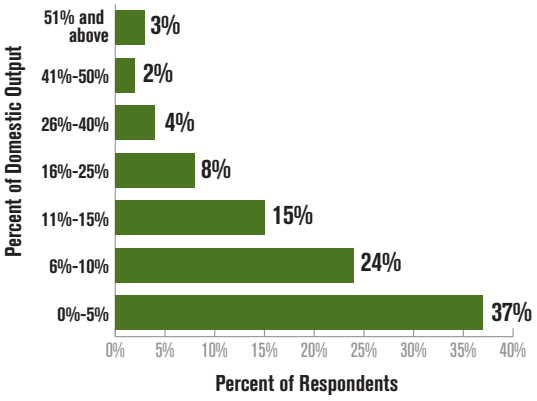
- **Highest level of market activity: Europe** with 44% of respondents building green on more than 60% of their projects.
- **Fastest growing market: Asia** where the population of firms building green on over 60% of projects is expected to more than double from 2008 and 2013.
- **Highest overall market by 2013: North America,** with 96% of respondents dedicated to green on at least 16% of projects—higher than the average of 94%.

Lowest Levels of Market Activity

- **The lowest current activity: South America.**
- **Lowest overall market by 2013: Middle East/North Africa**, where only 85% of firms will be dedicated to green (on over 16% of projects) in 2013—far less than the global average of 94%.

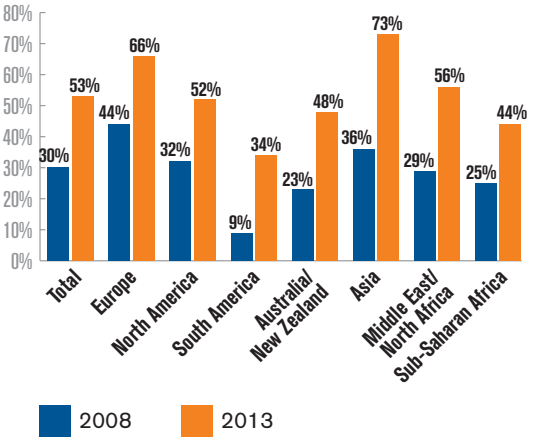
Despite regional variations, it is important to note that the share of firms at the lowest level of market involvement is dropping in every region.

Perceived Green Share of Construction in Home Country according to Global Construction Players



Source: *Global Green Building Trends SmartMarket Report*, McGraw-Hill Construction, 2008

The Population of Firms Largely Dedicated to Green (on over 60% of projects) 2008–2013



Source: *Global Green Building Trends Smartmarket Report*, McGraw-Hill Construction, 2008

Market Activity by Sector

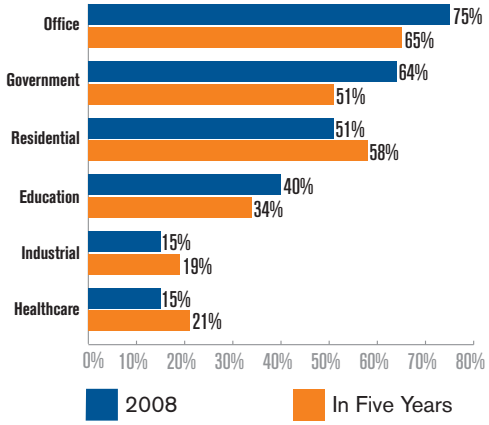
Globally, office construction leads green building activity, with 75% of all respondents ranking this as the most active green building sector in their region. The office sector is expected to remain the most active in 2013, though it will become less dominant as activity grows among other sectors (see chart at right).

However, it is important to note that the residential sector is expected to achieve the most dramatic growth in green building, jumping from 51% in 2008 to 58% in 2013.

Sector activity varies broadly by region:

- Government green building is very active in every region except for Sub-Saharan Africa and South America, reflecting the lower level of green building commitment by the governments in those countries.
- Infrastructure and industrial green building is active in every region except for North America and Australia/New Zealand.

Top Sectors where Global Construction Industry Players Expect to Build Green over Time (2008 to 2013)



Source: *Global Green Building Trends Smartmarket Report*, McGraw-Hill Construction, 2008

Benefits from Building Green

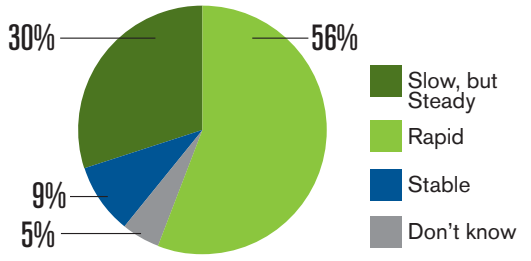
Profitability of Green Building

The global growth in green building activity is driven in part by an increasing awareness of the business benefits associated with it. Globally, **early market adopters anticipate that sales growth and profit levels associated with green building will grow over the next five years** (see chart at right).

Regional results:

Similar results are expected in nearly every region, the exception being Sub-Saharan Africa (49%) and Australia/New Zealand (46%) where less than half of respondents expect rapid growth.

Sales Growth and Profit Levels Associated with Green Building according to Global Construction Players



Source: *Global Green Building Trends SmartMarket Report*, McGraw-Hill Construction, 2008

Business Reasons for Green Building

Globally, green building professionals agree that the most important motivator for green building is that it is the right thing to do. Other top drivers include market transformation, market demand and client demand, all representing the growing strength of the green building marketplace.

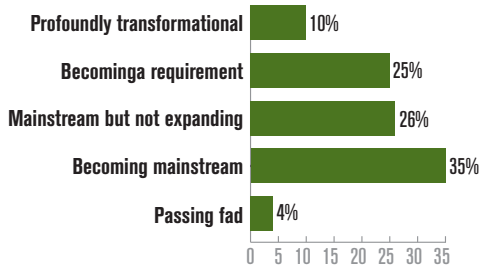
Regionally, internal corporate commitment and branding/public relations are the most important drivers in Asia, while environmental regulations play a bigger role in the Middle East/North Africa, Asia and Europe.

The Greening of Corporate America and U.S. Commercial Construction

In today's marketplace, corporations comprise 52 of the 100 largest economies in the world, and the 100 largest multinational corporations control approximately 20% of global assets. The growing commitment among these leaders to green building—in part due to their increasing recognition of the business benefits from building green—represents a tremendous opportunity for industry players to influence the expansion of commercial green building.

As can be seen below, nearly all corporate executives view green building as growing. One in ten believe it will be become "profoundly transformational," and another quarter view it becoming the standard for building design and construction.

Future Outlook on Green Building in Corporate America



Source: *The Greening of Corporate America SmartMarket Report*, McGraw-Hill Construction/Siemens, 2007

Corporate Involvement in Green Building

Green building is rapidly increasing throughout the real estate portfolios of corporate America. As can be seen in the chart on page 10:

- In 2007, approximately a quarter view themselves as market leaders, greening at least 30% of their portfolio green.
- This is consistent with the fact that 31% report having a higher than average corporate sustainability vision, 14% of which label themselves as market leaders (see chart on page 6).

Other market activities point to a growing trend toward corporate sustainability, including:

- Increased corporate reporting on environmental and sustainability policies.
- More partnerships and voluntary initiatives around green and sustainability.
- More money directed toward socially responsible investments.

Source: *Greening of Corporate America SmartMarket Report*, McGraw-Hill Construction/Siemens (2007)

Business Benefits of Corporate Green Building

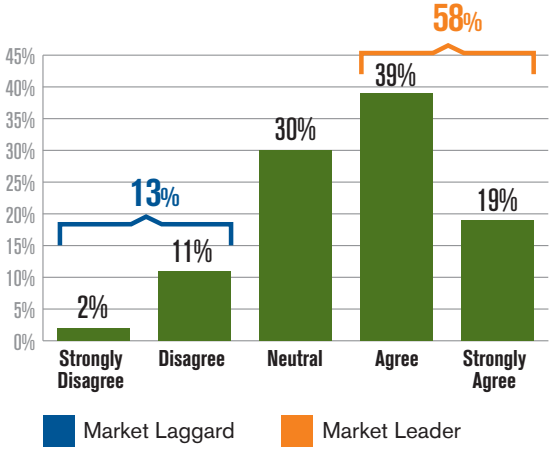
Corporate leaders report several business advantages to green building and sustainability. On average, CEOs perceive stronger benefits than the average corporate executive.

The top perceived benefits include:

- **Acts as a market differentiator:** 52% respondents report this advantage, and 63% of CEOs specifically.
- **Provides a competitive advantage:** 64% of large companies.
- **Improves financial performance**: 31% of respondents.
- **Lowers operating costs:** 58% of respondents; 67% of CEOs.
- **Fosters innovation:** 57% of respondents; 67% of CEOs.
- **Contributes to talent retention and acquisition:** 44%.

Source: *Greening of Corporate America SmartMarket Report*, McGraw-Hill Construction/Siemens (2007)

Corporate Perception of Whether Green Building Lowers Operating Costs



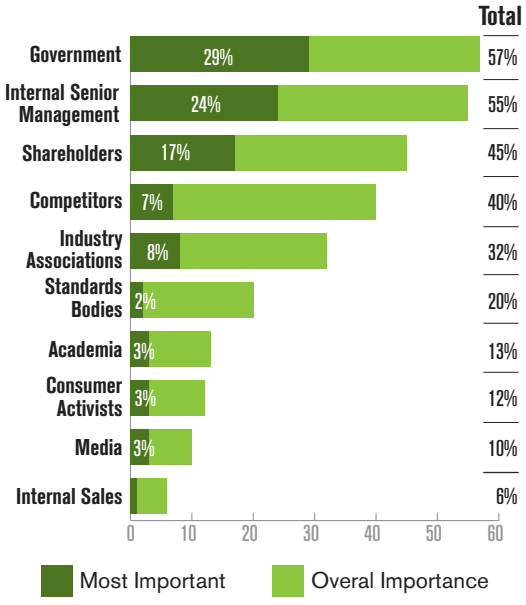
Source: *The Greening of Corporate America SmartMarket Report*, McGraw-Hill Construction/Siemens, 2007

Market Influencers

Corporate leaders, owners of commercial buildings across America, are influenced by a number of factors—government being the most important as can be seen below. Senior leadership is also critical. This intelligence helps the design and construction industry understand how to drive green in commercial construction.

It is no wonder government ranks high as an influence agent—policies are increasing rapidly and no longer are limited to mandates around publicly-funded buildings. See page 35 for details on this transformation.

Importance of Influence Agents that Drive Corporate Green Building



Source: *The Greening of Corporate America SmartMarket Report*, McGraw-Hill Construction/Siemens, 2007

Commercial Buildings: Green Building Market Opportunity

Market Opportunity

The involvement of corporate leaders help explain the size of green building in commercial buildings. At present, most of the green building activity in commercial construction is coming from office construction. For the most part, green building in commercial construction has been limited to activity in office building and retail facilities. There is very small penetration in hotels and other commercial buldings.

Office Construction: Green Building Market Size

Based on the current market conditions and construction starts, McGraw-Hill Construction estimates **green building in the U.S. office sector to be worth approximately $7-$9 billion in 2008.** Growth is expected over the next five years to be steady, though somewhat slower compared to institutional building types. Because the largest projects are more likely to be green (see page 8), the challenges some of these projects may have in securing financing in the current down market may cause project delays and therefore, the market opportunity to be smaller in the near term.

Retail Construction: Green Building Market Size

For 2008, McGraw-Hill Construction's data reflects relatively small penetration of green in the retail construction sector, though a few major owners, like Wal-Mart, have been building green and have created policies to continue to incorporate these elements into their new construction.

According to USGBC, there have been commitments by more than ten national retailers to build LEED into their standard design/ construction specifications. This suggests that there may be a larger share of this market green in the next five years.

Education Green Building

Construction activity in the education construction sector is expected to dip in 2008 and 2009 before rebounding. However, overall, it is a relatively stable market according to MHC economists. Importantly, the green portion of this market is expected to be one of the largest due to a number of factors including legislation, policies and public pressure. Since education comprises the largest share of nonresidential construction by value (23%, as can be seen on page 5), it is an especially important sector to track when looking at green building market opportunity.

This section offers some key intelligence to help navigate green building in this market successfully.

Overall Market Opportunity

Based on the current market conditions and construction starts, McGraw-Hill Construction estimates **green building to be approximately 15% to 25% of the U.S. education market by value.** This is greater than the expected average green building market. It is also expected to grow to a greater portion of the market over the next five years, potentially up to 30% of the education construction market by value in 2013.

The inclusion of green building elements in MHC's 60,000 annual proprietary digital plans and specs confirms this finding (see pages 25 to 32 for more details). Consistently, the specification rate of green for the education sector is higher than the average:

- Mention of LEED: 19.1% of education projects, 26.5% of dorm projects—compared to 14% average overall market.
- Specification rates of green product labeling programs is higher for Energy Star, FSC wood products, Green Seal, GreenGuard and formaldehyde-free insulation.

Involvement and Share of Green Building Market

McGraw-Hill Construction research studies show that industry players report a great deal of share of their green building activity in the education sector as well as strong growth for green in these buildings.

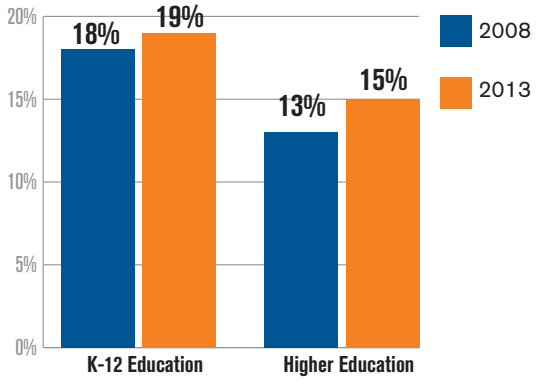
Architects/Engineers:

- Perceive growth of 6% in share of green K-12 projects and 15% increase in share of green higher education projects by 2013.
- Expect K-12 projects will remain their largest share of green building activity at 19% in 2013.

Contractors:

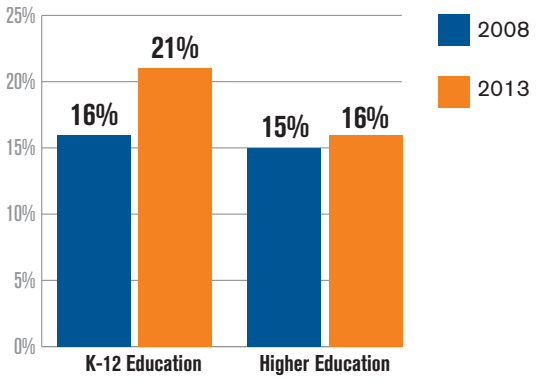
- Perceive growth of 31% in share of green K-12 projects and 7% increase in share of green higher education projects by 2013.
- Expect K-12 projects to surpass office projects and become the project type comprising their largest share of green building activity at 21% in 2013.

Share of Education Green Building Work Over Time according to A/E Firms



Source: *Commercial and Institutional SmartMarket Report*, McGraw-Hill Construction, 2008

Share of Education Green Building Work Over Time according to Contractors



Source: *Commercial and Institutional SmartMarket Report*, McGraw-Hill Construction, 2008

Benefits from Building Green Educational Facilities

Like the rest of the industry, school leaders report bottom line benefits from green building, including those listed below.

Reported Business Advantages of Green Buildings according to School Administrators and Facility Managers

Business Advantage	Perceived Benefits of Green Building
Decrease in Operating Costs	11%
Increase in Building Value	6%
Decrease in Energy Use	14%

Source: *Education Green Building SmartMarket Report,* McGraw-Hill Construction, 2007

In the past two years, the economic and political landscape has changed, providing more fiscal incentives to build green schools. Other than many policies encouraging and requiring green K-12 schools, over 35 colleges and universities (as of October 1, 2008) have enacted policies to build green. These include initiatives at many state schools and Ivy League colleges like Harvard and Princeton as well as other private schools like Carnegie Mellon, Emory, Rice and Bowdoin.

Other benefits supplement MHC's studies of the improvements from building green schools:

- **Improved test scores of 7%-18%**[1]
- **Outperforming peers by 5%-14%**[2]
- **Reduced absenteeism**[3]

[1] Heschong Group, 1999
[2] Niklas and Bailey, 1997
[3] Hathaway, 1995; Kuller and Linksten, 1992

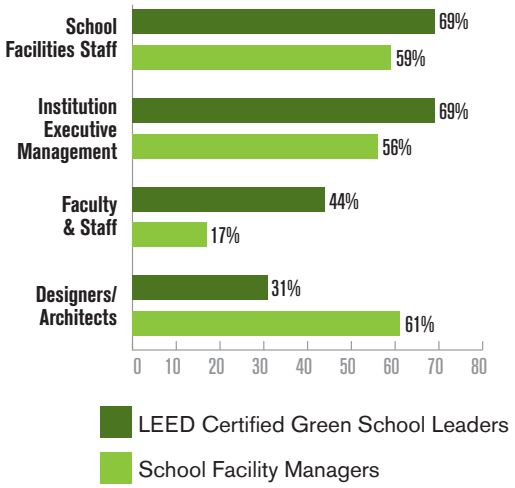
Market Influencers

There are a number of influence agents and motives behind building green in the education construction sector, which industry players need to understand to gain market share. As can be seen below, executive management and facility managers were seen as having the most influence.

Though students were not reported as having heavy influence (not included on Top Influence chart), we expect this to change over the next five years due to studies demonstrating the attractiveness of corporate responsibility. See page 11 for some statistics about the millennium generation's opinion on sustainable companies.

There are also a number of initiatives taking place across the country with respect to sustainability in colleges and universities. For example, the emergence of green rankings in respected college guides, such as the Princeton Review and Kaplan, indicate students are factoring sustainability into their college choices. Additionally, the emergence of new applications like "stepgreen.org" on social networking sites like Facebook and Myspace, suggest today's younger generation is getting involved in green at higher levels. These sites may offer effective ways for the industry to reach this demographic and understand what's driving them.

Top Influence Agents for Building Green Schools: Green Building Owners and Operators



Source: *Education Green Building SmartMarket Report*, McGraw-Hill Construction, 2007

Healthcare Green Building

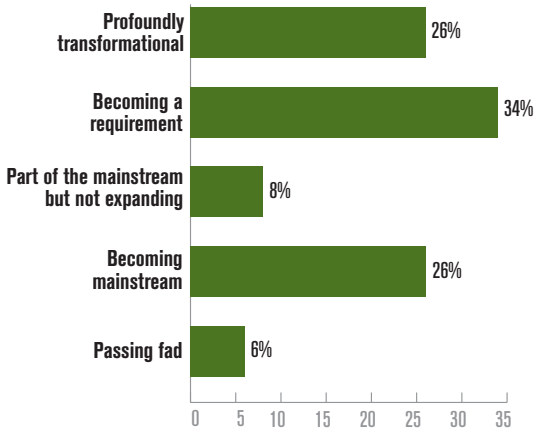
Despite a slight dip expected in 2008 and 2009, overall construction activity in the healthcare construction sector is expected to grow over the next five years, according to MHC economists.

The green portion of this market is expected to be strong due to a number of factors such as better information on the paybacks of green building, shifting policies and public pressure.

Furthermore, 26% of healthcare owners think green building will become "profoundly transformational" while another 34% believe it will become a requirement for future design and construction. Since healthcare comprises the third largest share of nonresidential construction by value (11% as can be seen on page 5), it is another important sector to track when looking at green building market opportunity.

This section offers some key intelligence to help navigate green building in this market successfully.

Future Outlook on Green Building in Health Care Construction Sector



Source: *Healthcare Green Building SmartMarket Report*, McGraw-Hill Construction, 2007

Overall Market Opportunity

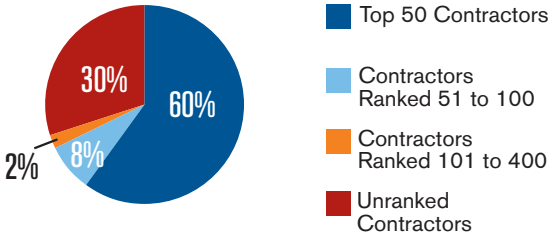
Based on the current market conditions and construction starts, McGraw-Hill Construction estimates **green building in the U.S. healthcare sector to be worth approximately $3-$4 billion in 2008.**

MHC expects moderate increases in this market, slightly above average. Results in MHC's *Commercial and Institutional Green Building SmartMarket Report* (2008) confirm these results. Both architects and contractors believe the healthcare share of green building work will increase.

Furthermore, healthcare is the third largest sector with mention of LEED in MHC's 60,000 digitized annual plans and specs. On page 8, it is also noteworthy that these projects are also larger by value. This indicates that the industry should target large owners to maximize their efforts to capture share of this green building market. If you couple this information with the fact that owners of hospitals tend to use the Top 50 firms from ENR's Top 500 Design firms and Top 400 Contractors list (seen in the pie charts at right), a manufacturer can be even more targeted in their outreach.

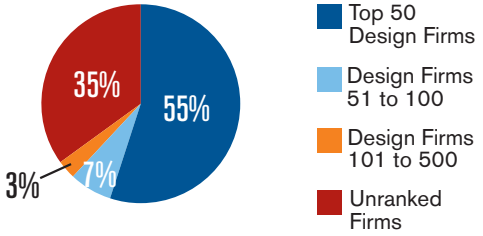
See pages 25-32 for more detailed information on green in plans and specs.

Top ENR 400 Contractor Market Share by Project Value Hospitals



Source: *Products and Players' Trends*, McGraw-Hill Construction, 2008

Top ENR 500 Design Firm Market Share by Project Value Hospitals



Source: *Products and Players' Trends*, McGraw-Hill Construction, 2008

Involvement and Share of Green Building Work

Healthcare owners report a growing level of green building activity—with 19% reporting heavy involvement in green in 2008. This bodes well for industry players with regard to green building opportunity.

Benefits from Building Green

Like the rest of the industry, healthcare owners report bottom line benefits from green building, including those listed below.

Reported Advantages of Green Buildings according to Healthcare Owners

Business Advantage	Perceived Benefits of Green Building
Energy Cost Savings	10%
Increase in Patient Recovery Rate	8% faster

Source: McGraw-Hill Construction *Healthcare Green Building SmartMarket Report* (2007)

It is likely that in 2008, these perceived benefits will increase, particularly as more data on the productivity benefits from green building are revealed. Though energy and operating costs are important, improvement of patients and productivity of staff are of particular importance to these owners.

Other benefits supplement MHC's studies of the improvements from building green healthcare facilities:

- **Lowers asthma rates, which nurses develop at two times the average.**[1]
- **Natural light lowers perceived pain, translating to 20% lower medication costs.**[2]
- **Reduces air contaminants that lead to 2 million patients acquiring infections during hospital stays.**[3]

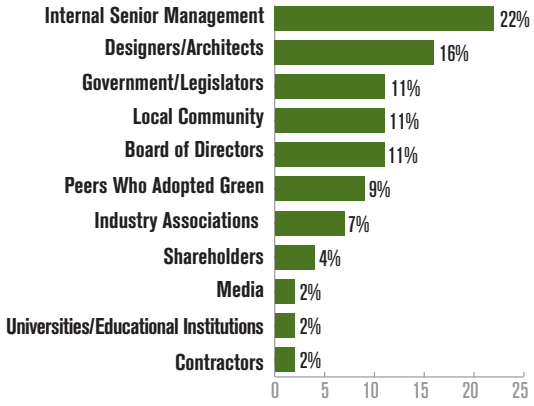
[1] ECRHS-II, The Lancet, 2007
[2] Ulrich, Zimring, Quan, Joseph, Choudhary, 2004
[3] CDC, Pennsylvania Health Care Cost Containment Council, 2007

Market Influencers

There are a number of influence agents and motives behind building green in the healthcare construction sector.

Like corporate leaders, healthcare owners view senior executives as particularly influential. The design community also has the opportunity to influence this sector.

Important Influence Agents that Drive Healthcare Green Building according the Healthcare Owners



Source: *Healthcare Green Building SmartMarket Report*, McGraw-Hill Construction, 2007

Residential Green Building

The green home marketplace is growing according to both builders and home buyers. In the context of today's down economy, green homes offer an opportunity for market differentiation for builders as well as cost savings and health benefits for homeowners. MHC's residential green building research demonstrates that the green home market is expanding despite the downward trends of the market as a whole (see page 4).

This section offers some key intelligence to help navigate green building in this market successfully.

Overall Market Opportunity

The market opportunity for green homes is growing. In 2005, information pointed to a green residential market size of 2% of starts, valued at $7 billion in that residential market. Despite the downturn, indicators point to an increased share of new homes containing green features over the past three years.

By the end of 2008, the U.S. Residential green building market is expected to be 6% to 10% of all new residential construction by value, which equates to approximately $12-$20 billion.

With a stronger construction market expected over the next five years, green building is expected to see healthy growth. Specifically, we expect it to double over the next five years, to be **worth 12% to 20% of all residential construction starts by value, or $40 billion to $70 billion.** This market value could be even greater depending on the absolute value of construction in 2013 (see chart at bottom right).

Effect of Down Market

Builders and consumers agree that green has an advantage in the down market.

- Forty percent of green home builders report a marketing advantage from green homes in today's housing slump, with **16% finding it much easier to sell green homes during today's economic conditions.**
- Seventy percent of **home buyers say they were more inclined to buy a green home in a down economy** than a non-green home.

Involvement and Share of Green Building Market

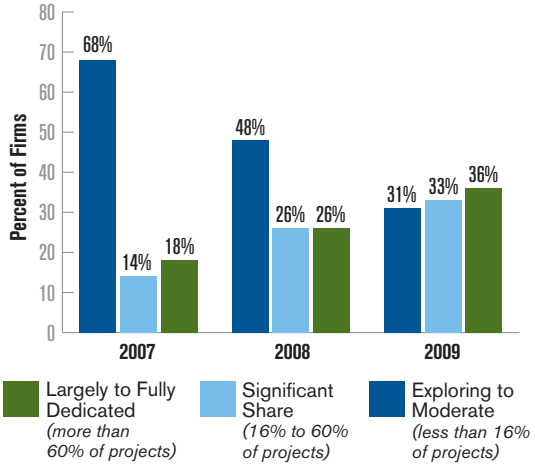
Residential Building

According to the findings of MHC's recent research into the residential marketplace, as reported in *The Green Home Builder SmartMarket Report* (2008), builders report shifts in their anticipated green activity from 2008 to 2009, with heavy involvement rapidly increasing:

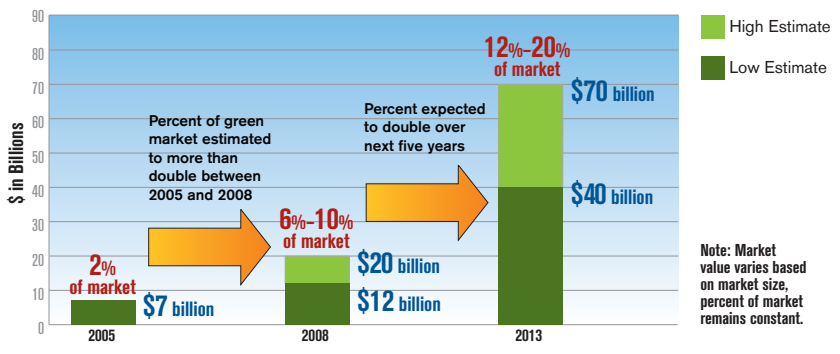
- Thirty-six percent report they will be building more than 60% of projects green in 2009.
- Larger builders report greater levels of expected involvement with 43% expecting heavy involvement by the end of 2009.

Residential

Involvement in Green Building over Time according to Home Builders



Residential Green Building Market Opportunity



Source: *The Green Home Builder SmartMarket Report*, McGraw-Hill Construction, 2008

Benefits of Green Homes

Satisfaction is a key element behind a consumer's willingness to recommend product information to friends and family. From MHC's studies, consumers report high levels of satisfaction with their green homes and the benefits they offer.

The highest levels of satisfaction:

- **Younger buyers** (18-34 years old)
- **Lower income buyers** (less than $50,000/year)

The top cited benefit among green homeowners is having a healthier place to live, followed closely by lower operating costs. On average, green homeowners are seeing an 18% reduction in both their energy and water bills in their new green homes. See page 11 for more information on the benefits of green homes.

Market Influencers

In order to understand the residential green building market opportunity, the opinions of builders and home buyers need to be understood—both similarities and differences—to provide messages that will resonate with the market.

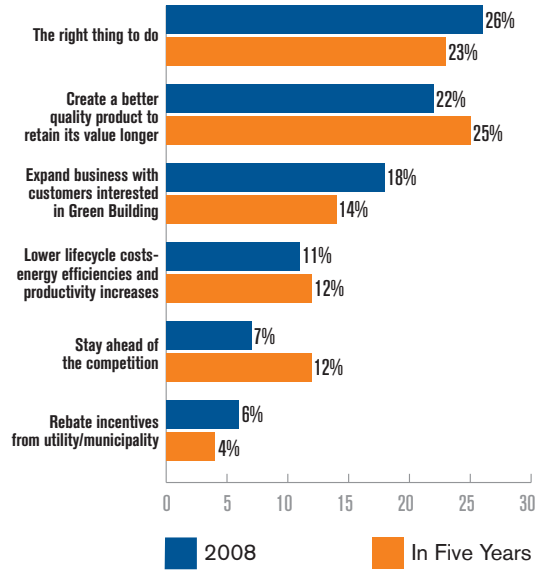
Builder motives to go green:

- **2008:** Highest ranked motivation is doing the right thing
- **2013:** Quality will become the most important factor influencing their shift to green.

For the home consumer, cost saving and health top the list, suggesting that industry players hoping to influence the consumer should focus on the benefits that can be achieved through a green home or by installing or using green practices and products in their new homes and in renovation projects.

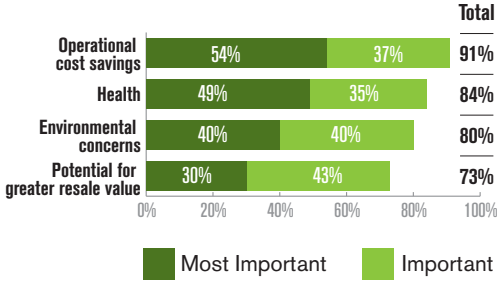
What is noteworthy is that occupant health grew in importance from 2007 to 2008, which suggests the green residential market is not solely driven by high energy prices.

Residential Market:
Highest Ranked Motivations to Build Green according to Home Builders



Source: *The Green Home Builder SmartMarket Report*, McGraw-Hill Construction, 2008

Important Factors Behind Green Home Purchase according to Buyers of Green Homes from 2005 to 2007



Source: *The Green Home Consumer: Driving Demand for Green Homes SmartMarket Report*, McGraw-Hill Construction, 2008.

Business Information Modeling (BIM) and Green Building

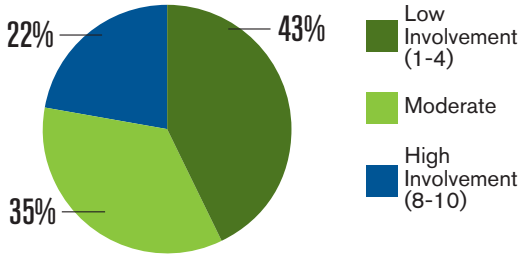
Building Information Modeling (BIM) involves using digital modeling software to more effectively design, build and manage projects. Because data incorporated into BIM can be used to analyze the performance of a building, including such green aspects as daylighting, energy efficiency and sustainable materials, it is becoming increasingly more important to designers of green buildings. With mounting desire by the industry to provide measures of green building performance, tools that can help deliver this information will become more critical in the future.

In fact, in a recent McGraw-Hill Construction survey, published in the MHC *Building Information Modeling: Transforming Design and Construction to Achieve Greater Industry Productivity SmartMarket Report* (2008), 73% of BIM users in the AEC/O community report being at least moderately involved in green projects, with 50% of them highly involved.

In terms of use in green projects, 57% of the industry report that BIM is being at least moderately used in green projects, with 22% reporting heavy use. What is noteworthy is that contractors report BIM use at a significantly higher rate than other industry players—with 30% reporting heavy use of BIM in green projects. There is clearly room to grow in terms of the use of BIM in green buildings, but with the creation of new green tools, the use of BIM will no doubt increase at the similar rates to green building.

BIM Use in Green Projects according to Total AEC/O Community

All Respondents



Source: *Building Information Modeling (BIM) SmartMarket Report*, McGraw-Hill Construction, 2008

Green in Project Plans and Specifications

McGraw-Hill Construction's proprietary database of 60,000 sets of digitized plans and specifications collected every year provides a wealth of data to investigate how different kinds of products are being used in buildings—as well as the growth of new trends.

In this section, MHC mined its digitized plans and specifications to map the specification rates of various green building programs, labels and products. We found that LEED is becoming increasingly mentioned in specs with larger projects at higher rates.

Additionally, we analyzed various green building product certifications because the industry is increasingly interested credible third-party programs to help guide them in selecting green products. In fact, according to data presented in McGraw-Hill Construction's *Commercial and Institutional Green Building SmartMarket Report* (2008), over half of specifiers (architects and contractors) find third party certification programs to be important to them in determining what green products to specify.

Analysis of these MHC plans and specs reveals an increase in specification rates of these labels. From 2006 to 2007, the U.S. government's Energy Star program and the Forest Stewardship Council (FSC) certified wood spec rates are rapidly increasing. Other green product labels are being used in only a small percent of projects, though they are also growing

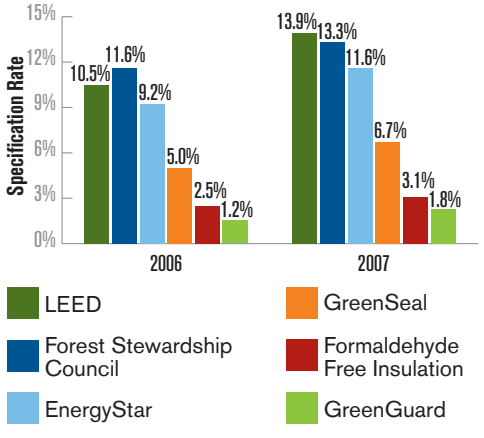
Finally, we also noticed that specification of product types that are used in green buildings are also increasing, including waterless urinals and radiant heating systems.

This data is yet another indicator of the tremendous growth of green building in design and construction activity. See pages 26 to 32 for specific specification rates on these topics.

Key Intelligence

- **The occurrence of LEED projects in specifications grew from 10.5% in 2006 to 13.9% in 2007.**
- **The occurrence of Energy Star in specifications grew from 9.2% to 11.6% in just one year.**
- **FSC certified wood has a relatively strong spec rate, growing from 11.6% to 13.3% from 2006 to 2007, with the largest growth in the Pacific Northwest.**
- **GreenSeal has some penetration with a 2007 specification rate of 6.7%.**
- **Health-sensitive construction sectors like education and healthcare had the highest specification of formaldehyde-free insulation.**

Specification Rate of Green Building Produce Designations 2006 to 2007

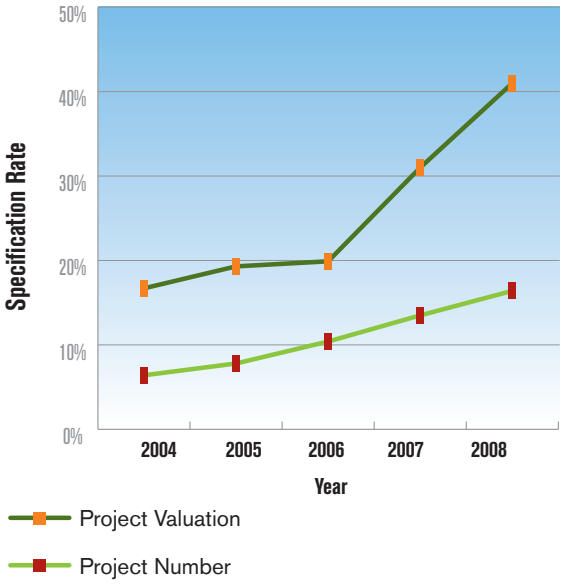


Source: *Products and Players' Trend*, McGraw-Hill Construction, 2008

LEED in Project Specification

The U.S. Green Building Council's LEED (Leadership in Energy and Environmental Design) green building certification program* is showing rapid expansion in buildings. Since its emergence in 1995, LEED has become the most well known guide for green building and MHC's proprietary 60,000 annual digitized plans and specs confirm this revealing increasing higher rates over time, especially for higher valued projects.

LEED Found In Project Specifications



Source: *Products and Players' Trends*, McGraw-Hill Construction, 2008

Key Intelligence

- The occurrence of **LEED projects in specifications has more than doubled since 2004**, growing from 6% in 2004 to approximately 14% at the end of 2007.
- LEED is being incorporated into the larger projects at a faster rate than smaller ones. On a project value basis the occurrence of **LEED in specifications in just the last two years has more than doubled from 20% in 2006 to over 40% through the 3rd quarter of 2008**. Comparatively, it grew only 50% in number of projects in that same time period.
- **There is variation in specification rate by project type (see graph on opposite page).**
  - **Dormitories:** Have the highest percentage of LEED mention in specifications—27% of projects and 66% of construction value.
  - **Retail:** Lowest mention of LEED in specifications—3% of projects and 9% of construction value.

** LEED (Leadership in Energy and Environmental Design) is a third party certification program and the nationally accepted benchmark for the design, construction and operation of high performance green buildings. Developed by the U.S. Green Building Council in 2000 through a consensus based process, LEED serves as a tool for buildings of all types and sizes. LEED certification offers third party validation of a project's green features and verifies that the building is operating exactly the way it was designed to.*

Products cannot be certified as LEED is a program only applicable for project certification. Individual products can contribute to points under the certification system; LEED criteria are performance-based. In attempting to meet these requirements, LEED practitioners identify products that have desired attributes. However, some LEED criteria do require specific product data as a part of a successful submittal.

Use of LEED by Construction Industry Sector

Education

The education sector represents one of the strongest markets for green building. This is reflected by trends demonstrated in the specs which show that dormitories are the industry sector with the highest rate of LEED being mentioned in specifications. The incidence of LEED in this sector is an overwhelming 66% of the market by value. This activity is likely bolstered by an increased level of activity among universities to incorporate green building into their standard practices. Initiatives like the Association for the Advancement of Sustainability in Higher Education (AASHE) and the American College and University Presidents Climate Commitment are garnering participation by leaders of universities into sustainable practices like green building. Also, campuses are competing for "green" distinctions through activities like the Solar Decathlon and purchasing green power. LEED is also mentioned in the specs for many other education projects in general—specified on 19% of them, which equates to 33% by project value.

Other Sectors

Healthcare, Offices and Apartments are also very strong sectors for LEED specification, with the share of the projects mentioning LEED worth more than a third of project value in each of these sectors. This indicates that LEED is part of the projects of the highest value, in particular:

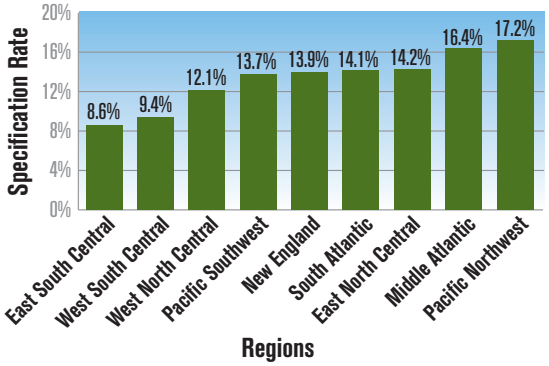
- **Offices:** LEED in 15% of project specs, or 40% by value.
- **Healthcare:** On approximately 15% of projects, or 37% by value.
- **Apartments:** LEED is specified on 11% of projects (below average), but those projects account for 36% of the sector by value (higher than average).

The retail sector represents untapped opportunity for green building. Research shows that LEED has not yet had large penetration for stores, with only 3% of projects at approximately 10% project value.

Regional Specification of LEED

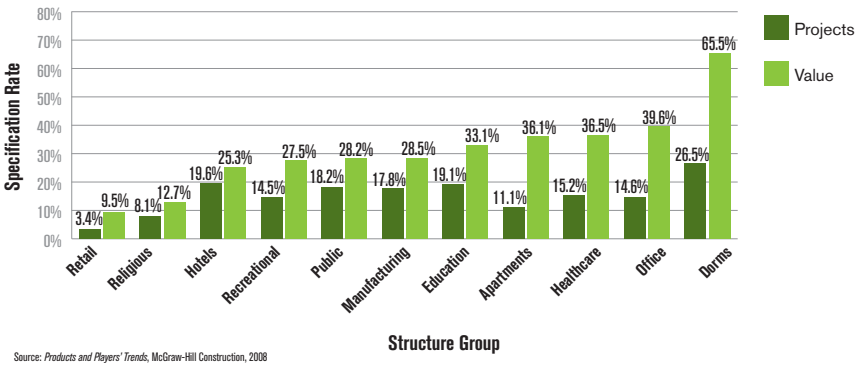
LEED specification is especially strong in the Pacific Northwest and Middle Atlantic, where 17.2% and 16.4% of projects from 2006 to 2008 (end of 3rd quarter) include mention of LEED. This is not surprising since the first LEED buildings took place in the Northwest region. Further, in this region, legislation and policies have been in place for a number of years either requiring or incentivizing green building construction. Many of the buildings in the Middle Atlantic are government or publicly owned. The government sector remains dedicated to the LEED program, with it being the preferred green building system of the GSA. The only regions with less than 10% of specification are the East South Central and West South Central regions. For more details on government trends related to green building see pages 35 to 36.

Specification Rate of LEED by Regions



Source: *Products and Players' Trends*, McGraw-Hill Construction, 2008

2007 LEED Specifications Rate By Structure Group



Source: *Products and Players' Trends*, McGraw-Hill Construction, 2008

Energy Star

Energy Star, a program started by the U.S. Environmental Protection Agency (EPA) in 1992 originally focused on energy-efficient computers. The program expanded in 1995 to include HVAC systems and other office equipment. In 1996, EPA partnered with the U.S. Department of Energy and added even more energy-efficient products. Today, it includes labels for over 50 product categories and thousands of different models oriented for buildings and homes.

According to MHC studies, Energy Star has the highest brand recognition in the market. In MHC's 2008 *Commercial and Institutional Green Building SmartMarket Report*, 63% of industry players indicate their awareness of the Energy Star program.

The relatively strong spec rate of Energy Star is likely due to the increasing focus on energy efficiency—partly from higher energy prices over the last five years, but also from a much higher level of penetration in the media and public consciousness about energy efficiency and its relation to lowering greenhouse gas emissions and carbon footprints.

As show in the graph on page 25, the rate of specification of Energy Star increased strongly from 2006 to 2007. In just one year, it jumped from 9.2% in 2006 to 11.6% in 2007.

We would expect the spec rate for Energy Star to increase in the near-term. There remains sensitivity in the market to energy efficiency. Additionally, with recent legislation and government plans around greenhouse gas emission reductions, programs like Energy Star will become more important.

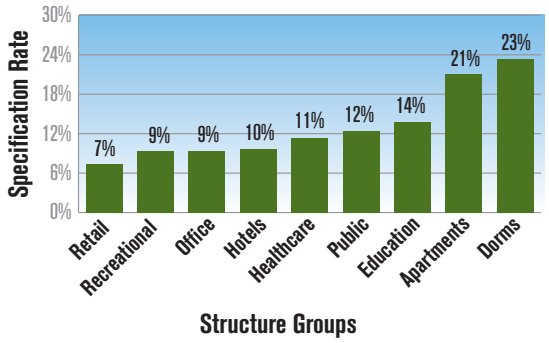
Comparisons across Construction Industry Sectors

Significantly higher levels are occurring in dorms and apartments—both at over 20%. The strong spec rate in dorm projects is consistent with the overall high level of green in these project specs. Owners of apartments would be drawn to Energy Star products in order to use them as a selling point to an energy-conscious consumer.

Regional Comparisons

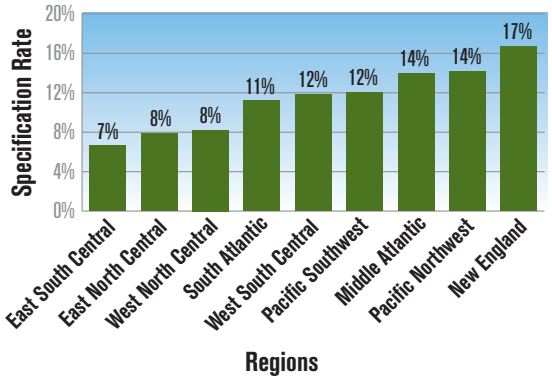
New England has the highest specification rate of 17%, while the central regions have spec rates below average. The East and West coasts have utility and government incentives for Energy Star in particular, which likely contribute to these rates.

Energy Star Specification Rate by Structure Group



Source: *Products and Players' Trends*, McGraw-Hill Construction, 2008

Energy Star Specification Rate by Regions



Source: *Products and Players' Trends*, McGraw-Hill Construction, 2008

Forest Stewardship Council (FSC)

FSC, a non-profit organization started in 1993, is devoted to encouraging the responsible management of forests across the world. Their standards ensure forestry is practiced in an environmentally responsible, socially beneficial and economical way.

FSC has accredited twelve third-party organizations to serve as certifiers of forests with responsible management practices. This certification of forests then offers tracking of forest products that are sustainable.

Interestingly, FSC certified forest products have a higher overall mention in project specifications compared to other green product labeling programs. This unexpected finding does not correlate with the overall market awareness of FSC, which is significantly lower than Energy Star. In MHC's *Commercial and Institutional Green Building SmartMarket Report* only 21% of the industry was aware of FSC, compared to over 50% of Energy Star. What this suggests is that when a specifier or owner is aware of FSC, they tend to include it in their projects.

Specification of FSC is also increasing—with a rise from 11.6% in 2006 to 13.3% in 2007 (as can be seen on page 25).

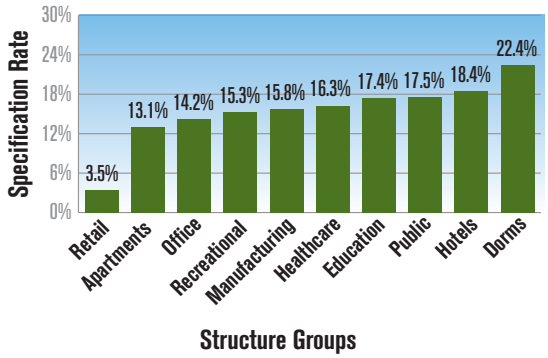
Comparisons across Construction Industry Sectors

Dorms have the highest FSC Specification Rate compared to other industry sectors at 22.4%. Again, this finding is consistent with the high level of mention of green in dorm projects in general. A strong spec rate occurs across project types. Retail is the one notable outlier.

Regional Comparisons

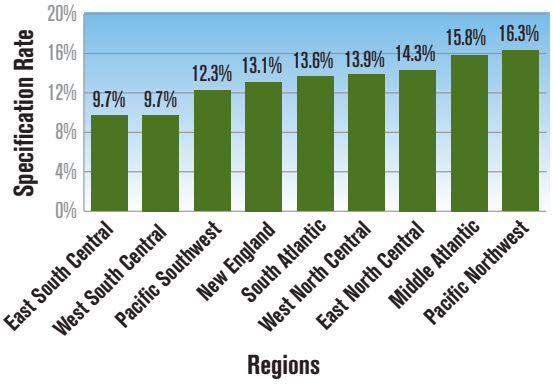
The Pacific Northwest and Middle Atlantic yield the highest specification rates at 16.3% and 15.8% respectively. With the U.S. forestry industry located in the Pacific Northwest, higher awareness and specification is to be expected. The East South Central and West South Central regions, where wood is used less in projects had the lowest specification rates.

FSC Specification Rate by Structure Group



Source: *Products and Players' Trends*, McGraw-Hill Construction, 2008

FSC Specification Rate by Regions



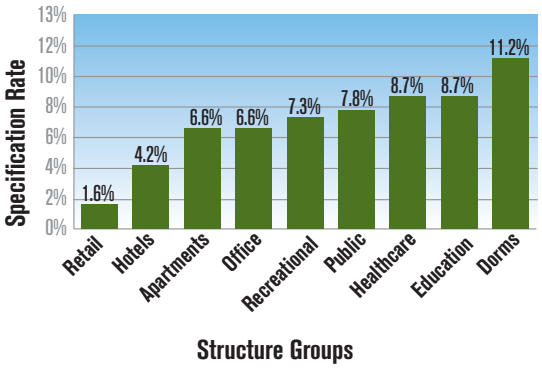
Source: *Products and Players' Trends*, McGraw-Hill Construction, 2008

Green Seal

Green Seal is a non-profit organization that began in 1989 to serve as a third-party certifier and standards development body. It is the largest U.S.-based ecolabel organization. Their most well-known certification is of paints and coatings. However, they certify a range of other building products.

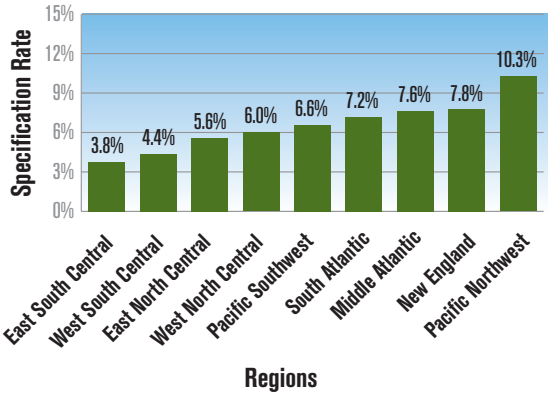
In MHC's 2008 *Commercial and Institutional Green Building SmartMarket Report*, approximately 20% of industry players were aware of Green Seal. The specification rate of Green Seal is growing—from 5% in 2006 to 6.7% in 2007. As health effects of buildings become more of a concern, more measurable and established labels—such as Green Seal—that are based on sound science will be used more prevalently. We estimate health impacts of green building will gain ground moving forward, and Green Seal may grow as a result.

Green Seal Specification Rate by Structure Group



Source: *Products and Players' Trends*, McGraw-Hill Construction, 2008

Green Seal Specification Rate by Regions



Source: *Products and Players' Trends*, McGraw-Hill Construction, 2008

LEED may have contributed to Green Seal's spec rate. GreenSeal is explicitly mentioned as a way of achieving Credit 4.2 of LEED's Indoor Environmental Quality section.

Comparisons across Construction Industry Sectors

The specification rates are highest in dorms, education and healthcare buildings. All three of these sectors have sensitivities to health concerns. Green Seal would be attractive because its label addresses indoor air quality.

Retail owners, whose occupants would be more transient, are predictably not specifying programs like Green Seal often.

Regional Comparisons

The highest specification rate is in the Pacific Northwest and on the East coast. The lowest specification rates are found to fall in the central regions.

Formaldehyde-Free Insulation

Formaldehyde is classified by the U.S. EPA as a probable human carcinogen. Furthermore, the International Agency for Research on Cancer (IARC) has determined that there is "sufficient evidence" that occupational exposure to formaldehyde causes nasopharyngeal cancer in humans. As a result, many owners—possibly spurred both by a desire to improve occupant health and to avoid any potential lawsuits—are drawn to formaldehyde-free products as well as other products that do not emit volatile organic compounds (VOCs). As more of these products penetrate the market, and contractors become more used to them, we would expect specification to continue to increase.

Specification of formaldehyde-free insulation (FFI) is still relatively small as can be seen on the chart on page 25, though there was an increase from 2006 to 2007 as it grew from 2.5% to 3.1%.

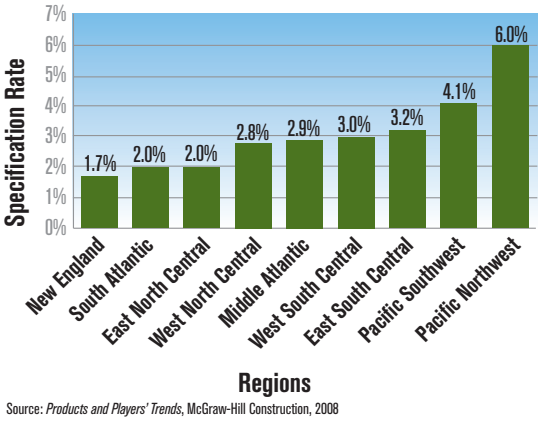
Comparisons across Construction Industry Sectors

Dorms and Education buildings have the highest specification rates. Healthcare is third highest. Again, the education sector has strong penetration of green, and there is an added sensitivity to human health due to the impact on children. Similarly, healthcare owners would be especially sensitive to the health advantages of FFI.

Regional Comparisons

The specification rate for FFI is highest in the Pacific regions. This is likely due to stronger air emission standards in states in this region—particularly in California.

Formaldehyde-Free Insulation Specification Rate by Regions



Source: *Products and Players' Trends*, McGraw-Hill Construction, 2008

GreenGuard

GreenGuard is a voluntary certification program that tests and then identifies products' air emissions. It tests for emissions of formaldehyde, VOCs, aldehydes, respirable particles, ozone and other pollutants. Exposure concentrations are then compared against specific pollutant standards for each product type using standards established by the U.S. EPA and OSHA, as well as other state and federal agencies.

The relative awareness of GreenGuard among industry players is relatively small. In MHC's 2008 *Commercial and Institutional Green Building SmartMarket Report*, only 14% of industry players were aware of it, though architectural firms—often driving specification—were more aware of the label at 22%.

Again, as we anticipate health concerns to become more of a concern to the market, penetration of GreenGuard certified products may increase. However, as can be seen in the chart on page 25, the incidence of GreenGuard in project specifications remains low at 1.2% in 2006 and 1.8% in 2007.

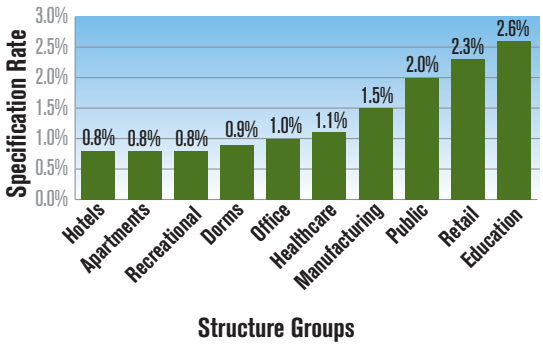
Comparisons across Construction Industry Sectors

Although the spec rates are relatively low, there is some deviation by sector—with education, retail and public buildings having above average rates. Again, the strength in the education sector is expected—as well as in public buildings—due to the regulations around these facilities.

Regional Comparisons

The highest specification rates are occurring in the Middle Atlantic region by an overwhelming margin at 4.3% compared to the rest of the regions of which none are over 2.4%. With a great portion of government buildings located in this region, this higher spec rate is likely due to policies for the construction of these buildings.

GreenGuard Specification Rate by Structure Group



Source: *Products and Players' Trends*, McGraw-Hill Construction, 2008

Specification of Efficient Products

Specification of products that are often used in green projects can serve as another indicator of the growth patterns related to green building. MHC analyzed its digitized plans and specs related to three product types—radiant heating systems, waterless urinals and sensor faucets—to see if any trends could be discerned.

Again, what was found is that specification of these products is increasing, and as green building continues to grow in market size, we would expect these products to also increase in specification and in use.

Sensor Faucets

While Sensor Faucets are often marketed as a more hygienic faucet because no contact is needed for the water to turn on and off, the specification rate has remained relatively flat between 2005 and 2007. The exception has been the strong specification in healthcare and education buildings. Not only are these institutional buildings two of the stronger sectors for green building, they would also be sensitive to market messages about the hygienic advantages of sensor faucets.

Waterless Urinals

In general, the specification rate for waterless urinals remains small, averaging just under 1.5%. However, as green building continues to grow and building codes change, we expect more buildings will integrate waterless urinals into their projects.

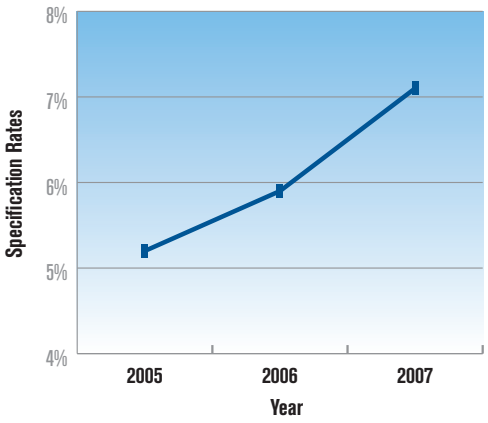
Of particular note is the relatively higher rate of specification of 3.8% in dorm projects, which again is consistent with greater levels of specification of green in the education sectors.

Radiant Heating Systems

Radiant heating systems offer more efficient heating because no energy is lost through ducts. They also offer health advantages to people with allergies due to the lack of moving air. In fact, we do see incidence of radiant heating systems increasing consistently from 5.2% in 2005 to 7.1% in 2007—a 36% growth.

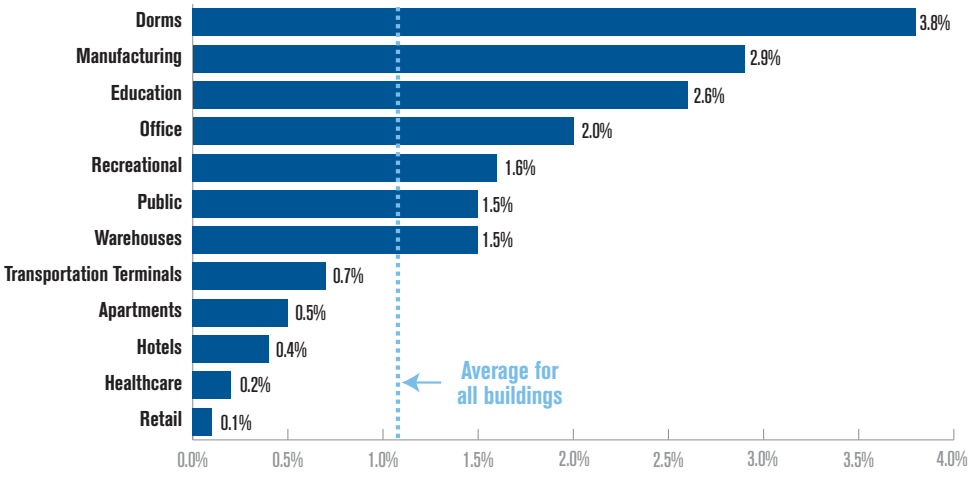
Because radiant heating systems can also be heated with a variety of energy sources, including renewable energy, we expect that an increase in use of renewable energy will spill over and affect the rate of specification of radiant heating systems.

Specification Rates for Radiant Heating Systems from 2005 to 2007



Source: *Products and Players' Trends*, McGraw-Hill Construction, 2008

Specification Rates for Waterless Urinals by Industry Sector
(based on projects from 2004 to 2007)



Source: McGraw-Hill Construction, 2008

Green Product Use Shifts Over Time

Green Building Product Use

Since 2005, specifiers in both residential and nonresidential construction report increased use of green products, and in the next five years. This trend is expected to continue, with U.S. construction industry players expecting to be integrating more sustainable products into their projects. Below are some research findings that can help the industry understand these trends and identify opportunity for different product types.

Global Construction Players

Early adopters in global green construction report their highest rates of specification to be occurring in the following product categories: electrical (51%), mechanical (50%) and thermal and moisture protection (47%). However, they expect most growth over the next five years will be in the specification of green building automation controls (54%), thermal and moisture protection (54%) and mechanical systems (53%), with the growth of electrical the smallest. Finishes and furniture are also increasing. This suggests that health effects of green products will become more important in the future to the global community.

Nonresidential Construction

As reported in MHC's *Commercial and Institutional Green Building SmartMarket Report* (2008), nearly the entire industry (88%) is incorporating some kind of green building product into their projects. Even more expect to be using green products in five years—at 91%.

Between 2005 and 2008, specification of green products grew in nearly every product category, the exception being wood & plastics.

Specification Trends:

- Most emphasis on mechanical systems, building automation/control (see chart below right).
- In 2008, green furnishings and renewable energy are specified least.
- Top green products/practices in nonresidential overall differ by industry player.
  - **Architects most often specify building systems—** such as green mechanical systems (70%), plumbing fixtures (69%) and building automation (68%).
  - **Contractors focus on materials and finishes—** most frequently specifying green finishes (70%), thermal and moisture protection (67%) and doors and windows (66%).

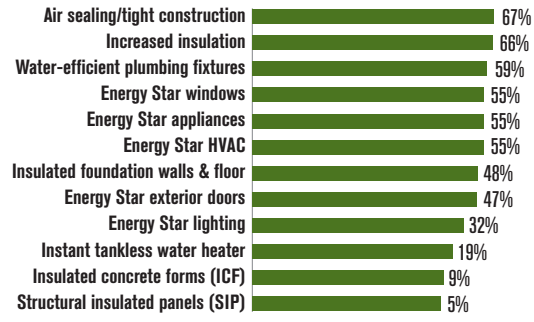
Residential

For the most part, builders report using green products that lead to energy efficiency. In particular, they focus on tight construction, insulation and Energy Star products. As can be seen below, water-efficient plumbing is also deemed important. All of these products lead to homeowner savings, which is likely a marketing and sales benefit for builders.

Interestingly, the features requested by home buyers differ somewhat. For them, insulation is also important, but tankless water heaters are the second highest requested green building product, though it ranked near the bottom of builder's list of used green building features.

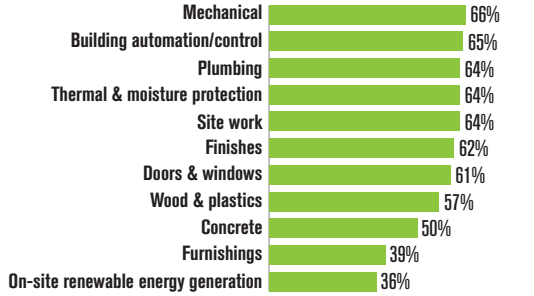
What these findings suggest is that consumers prefer products they can see and touch—like appliances and tankless water heaters—whereas builders are more likely to recognize the improved home performance coming from certain products. These findings can help product manufacturers understand the drivers behind the selection of different green home building products.

Residential Construction
Most Highly Used Green Building Features according to Home Builders



Source: *The Green Home Builder SmartMarket Report*, McGraw-Hill Construction, 2008

Nonresidential Construction
Percent of Green Products Specified according to Total AEC/O Community



Source: *Commercial and Institutional SmartMarket Report*, McGraw-Hill Construction, 2008.

Industry Trends in Renewable Energy

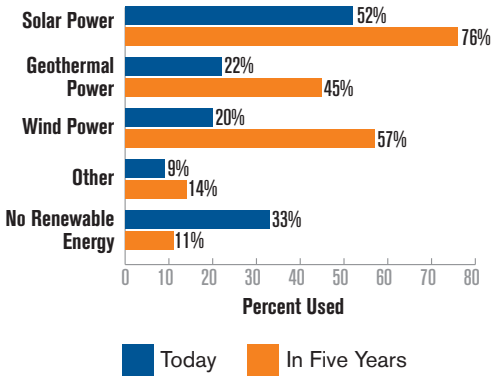
Renewable energy sources such as solar, wind and geothermal help provide solutions to many challenges today. They can help reduce domestic carbon dioxide emissions, create new jobs (see page 12 for information on green jobs) and reduce dependence on foreign energy supplies.

Although solar energy currently provides less than 0.1% of U.S. electricity, that number is expected to grow to 10% by 2025 with the use of solar photovoltaics and concentrated solar power. Wind energy is the fastest-growing renewable energy source in the U.S. According to a report by the U.S. Department of Energy, wind is projected to account for 20% of the U.S. energy market share by 2030.

Global Market

About two-thirds of early adopters are using some form of renewable energy in their projects. However, they report rapid growth in five years, with nearly 90% incorporating renewable energy in their projects. As can be seen below, most of that will be solar, but they also report strong future use of wind power.

Global Construction Industry Most Used Forms of Renewable Energy from 2008 to 2013 according to Global Industry Players



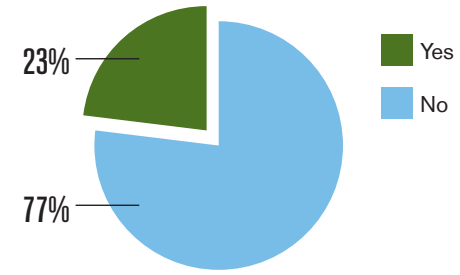
Source: *Global Green Building Trends SmartMarket Report*, McGraw-Hill Construction, 2008

U.S. Construction Market

In nonresidential construction, 36% of architects and contractors report they are specifying on-site renewable energy generation into their projects. With the growth of green building and government investment in clean energy technologies, not to mention additional tax credits passed in 2008, we would expect this to increase.

Residential construction is starting to incorporate renewable energy into projects as well. Though only a small portion of home builders (8%) report using renewable energy in projects, nearly a quarter of green home buyers say their homes have renewable energy technologies. This suggests that this emerging "green" consumer is attracted to renewable energy generation.

U.S. Green Homeowners Reported Use of Renewable Energy in New Green Home



Source: *Global Green Building Trends Smartmarket Report*, McGraw-Hill Construction, 2008

Government Expansion & Policy Trends

Market Opinion

Across the U.S. construction industry—nonresidential and residential—government is seen as a significant influence agent to green building (see pages 16 to 24). Senior executives in corporate America are most influenced by government and think green building will become a requirement. Construction industry players agree about the role of government. According to MHC's 2008 *Commercial and Institutional Green Building SmartMarket Report*, over 60% say it is an important trigger to increasing green building.

U.S. Involvement in Global Efforts

Due to a number of factors, it is expected that the U.S. will become more active on an international stage with regard to environmental issues, including green building. Some of these drivers include growing international pressure, increasing acceptance by the American public, new leadership at the federal government level under the Obama Administration and the composition of the 111th Congress. The level and type of involvement that will take place in the short term is still to be seen, but the emphasis will undoubtedly involve the growth of a domestic renewable energy market that will affect green building and related industries.

Federal Shifts

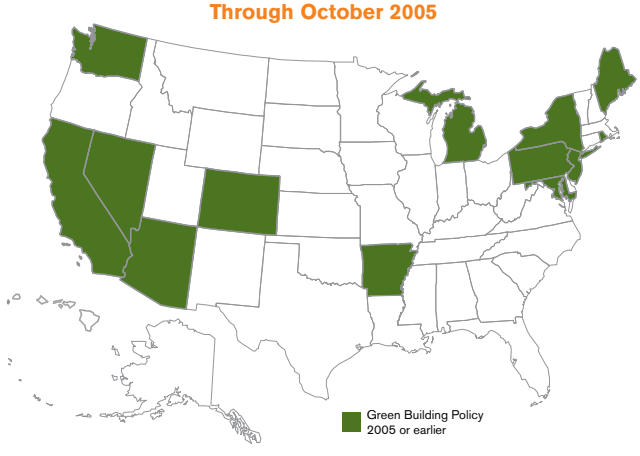
Though the federal government was one of the earliest players in green building, its role over the last three years has been diminished by more aggressive policies at the state and local levels. However, as a major landlord, the U.S. General Services Administration will continue to impact the expansion of the green building market.

The most recent significant activity around green building at the federal level was the extension of the renewable energy tax credits through the "Energy Economic Stabilization Act of 2008," passed on October 3, 2008. The credits apply to energy-efficient home improvements that had expired in 2007 as well as for home builders and owners and designers of energy-efficient residential and commercial buildings. The Act also extended credits related to solar energy systems, and new credits were established for electric vehicles and small wind energy systems.

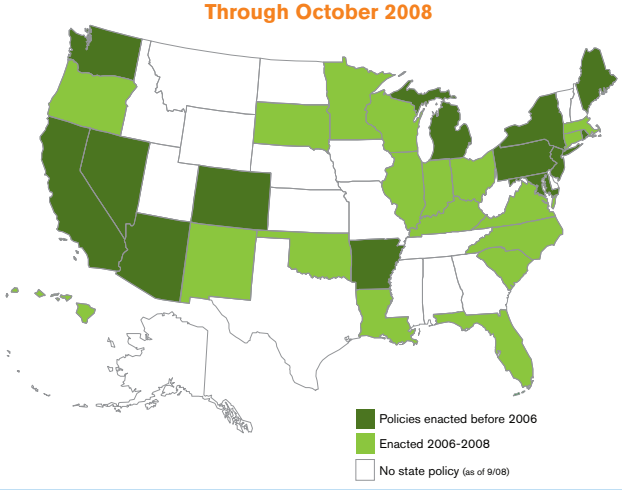
These credits will no doubt encourage the renewable energy market, making the technology more affordable, available and easier to integrate into buildings.

States with Green Building Policies over Time

Through October 2005



Through October 2008



State & Local Government Efforts

In the last three years, the proliferation of green building policies, standards, legislation and programs at the state and location level has been astounding. As can be seen in the chart at right and maps on page 35, there has been tremendous increase:

- At the state level, there were policies in only 13 states in 2005, but by October of 2008, this number had nearly tripled to where 31 states had policies on the books.
- Local governments have increased at similar rates—nearly tripling from 57 localities in 20 states to 156 localities in 35 states.

Most state and local policies are oriented around the greening of public buildings and buildings, like schools, funded with public money. What has been telling has been the trend of these governments shifting from setting green building policies through executive orders to doing so through legislative acts. This shift is an indicator that the government and public are more invested in making green building part of their long-term plans.

Widespread polities in the education sector, in particular, are expected to serve as significant drivers of green building in institutional construction. However, more policies at the state and local level are emerging that encourage or require green building in commercial construction. As a result tracking future trends in government regulations will be essential in order to understand the market fully.

An example of a trend that may affect green building moving forward is the recent requirements in places like California and Washington, D.C. that all buildings report energy use. Washington, D.C. is even requiring disclosure of Energy Star scores. Though reporting is only the first step, as information becomes available, benchmarks and other measures will be developed further, influencing future market activity.

Number of Localities with Green Building Policies from 2005 to 2008
(organized by states with the largest number of local governments involved)

State	2005	2008	Change
California	22	41	+19
New York	2	11	+9
Maryland	1	8	+7
Arizona	2	7	+5
Texas	2	7	+5
Colorado	1	6	+5
Florida	2	6	+4
Georgia	2	6	+4
Washington State	4	5	+1
Illinois	3	4	+1
Massachusetts	4	4	---
Michigan		4	+4
Missouri	1	4	+3
North Carolina	1	4	+3
Ohio	2	4	+2
Oregon	1	4	+3
Connecticut	1	3	+2
New Jersey	2	3	+1
Pennsylvania		3	+3
Virginia	2	3	+1
Maine		2	+2
New Hampshire		2	+2
Tennessee		2	+2
Utah	1	2	+1
Alaska		1	+1
Arkansas		1	+1
District of Columbia		1	+1
Hawaii	1	1	---
Kansas		1	+1
Minnesota		1	+1
Mississippi		1	+1
New Mexico		1	+1
South Carolina		1	+1
West Virginia		1	+1
Wisconsin		1	+1
TOTAL	**57**	**156**	

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