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New and Remodeled Green Homes:

Transforming the Residential Marketplace

Premier Partners:



SmartMarket Report

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New and Remodeled Green Homes: Transforming the Residential Marketplace SmartMarket Report

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McGraw Hill CONSTRUCTION

About McGraw-Hill Construction

McGraw-Hill Construction (MHC), part of The McGraw-Hill Companies, connects people, projects and products across the design and construction industry, serving owners, architects, engineers, general contractors, subcontractors, building product manufacturers, suppliers, dealers, distributors and adjacent markets.

A reliable and trusted source for more than a century, MHC has remained North America's leading provider of construction project and product information, plans and specifications, industry news, market research, and industry trends and forecasts. In recent years, MHC has emerged as an industry leader in the critical areas of sustainability and interoperability as well.

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Introduction

NEW AND REMODELED GREEN HOMES: TRANSFORMING THE RESIDENTIAL MARKETPLACE

We are excited to report that the green share of single family home construction, by value, has doubled over the last three years, increasing from 8% in 2008 to 17% in 2011. **As a result, the 2011 new green homes market offered a \$17 billion opportunity.** During a time when overall construction plummeted, this increase—in both market share and value—marks a bright spot in an otherwise dismal market.

Market conditions suggest that green homes will continue to grow in market share over the next five years. **We expect a five-fold increase between 2011 and 2016 to comprise a 29%–38% market share—potentially a \$87–\$114 billion opportunity.**

This strong growth of green suggests that builders who are not knowledgeable in green home building will be left behind. **As activity picks up, those that have been building green will have the most to gain.** And builders are recognizing that. One third report that by 2015, they will be dedicated to green—that is, building more than 90% of their projects green—up from 17% 2011.

This study also included the opinions and green activities of home remodelers, whose work during the downturn included a focus on green and efficiency upgrades. Although still at lower green adoption rates compared to new home builders, **remodelers are increasing levels of green involvement more rapidly**, and as customers reap the benefits of lower bills and higher home

values, **green remodeling may eventually exceed new green homes.**

Despite the downward pressure on home prices, discriminating consumers have helped keep green in the forefront. Key findings of the research:

- **One third of builders expect to be dedicated to green building by 2016.**
- **46% find building green makes it easier to market in a down economy; 71% of dedicated green firms report the same.**
- **61% of builders and 66% of remodelers report that home buyers are willing to pay more for green homes—at increases of 3% for builders, 5% of remodelers and 6% for those experienced in green.**
- **Higher quality and concerns about rising energy costs top the list of the many factors driving green homes.**
- **77% of firms dedicated to green find that green has helped their bottom line.**
- **Energy efficiency is important in green homes, with nearly all adopting these practices. But remodelers also place high value on waste management and sustainable materials.**

We are excited at the implications of this study and are grateful to the National Association of Home Builders and Waste Management for supporting this research and helping us to continue to inform the industry about critical market trends.



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the New Jersey Institute of Technology.

Michele A. Russo, LEED AP, has been working in environmental policy and communications for nearly 15 years. She currently serves as MHC's Director of Green Content & Research Communications, where she is responsible for helping direct the green content across MHC's portfolio of products and services, including the management of MHC's SmartMarket Report series. Russo is also a strong contributor to The McGraw-Hill

Companies' corporate initiatives around sustainability. Previously, she served as Executive Director of the Clean Beaches Council and Deputy Director of the National Pollution Prevention Roundtable. She has authored several articles around pollution prevention and toxics reduction and has spoken at a number of events on green building trends and environmental policy. Russo has a B.S. in Chemical Engineering from Cornell University and a Masters in Public Policy from Harvard University's Kennedy School of Government.

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Front Cover:
Porch of "Zero Energy Casita"
Ferrier Custom Green Home,
Fort Worth, TX (see page 12)

This page:
Left: Kitchen in "Heather's Remodel"
Ferrier Custom Green Home,
Fort Worth, TX (see page 13)

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Executive Summary

Green residential construction has grown during the economic downturn, and it is expected to continue to grow dramatically as the market recovers.

More home builders and remodelers are building green homes and incorporating green features in their projects. In fact, by 2016, the green share of new home construction is expected to be between 29% and 38%. The research findings in this report demonstrate that this growth is due to the strong business benefits offered by green, especially for firms that are more experienced with green work.

Level of Green Involvement Growing

Builders currently report higher levels of green building activity than remodeling firms. In five years, half of the builders expect more than 60% of their new home projects to be green, nearly double the number of firms that currently are building green at that level. This projected growth marks a dramatic shift coming in the share of green in the overall residential market.

Remodelers may be lagging behind builders, but they are catching up rapidly. From 2011 to 2016, the percentage of remodelers expecting to be doing more than 60% of their projects green is over one third (34%)—more than two and a half times the current 13%.

Firms that solely do remodeling expect the same dramatic rate of growth but slightly less market share by 2016, which further supports the conclusion that remodelers are somewhat lagging behind builders in green but that their involvement is rapidly accelerating.

Both builders and remodelers expect the improving forecast for residential construction to have a positive impact, not just on the volume of green work but also on the total share of their work that is green. The strong performance of green during the recession demonstrates that customers see value in the savings offered by green homes, and the even stronger growth expected during the recovery is evidence that other factors besides cost savings are also encouraging the growth of green.

Triggers for Green Building Activity

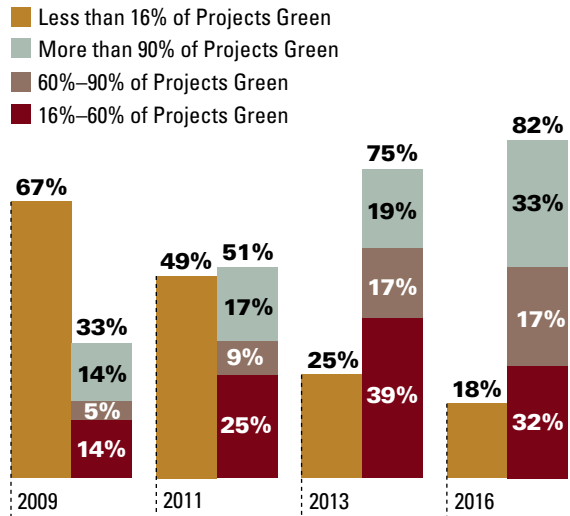
Many factors are driving the green market, but for home builders and remodelers alike, higher quality is one of the top triggers for building green. In fact, the more green work home builders perform, the more important this trigger becomes, influencing 90% of builders doing more than 60% green homes compared to 72% of builders overall.

Another top trigger for both builders and remodelers alike is energy cost increases. This is further evidence that consumers value the expected utility bill savings.

Involvement in Green Activity Over Time

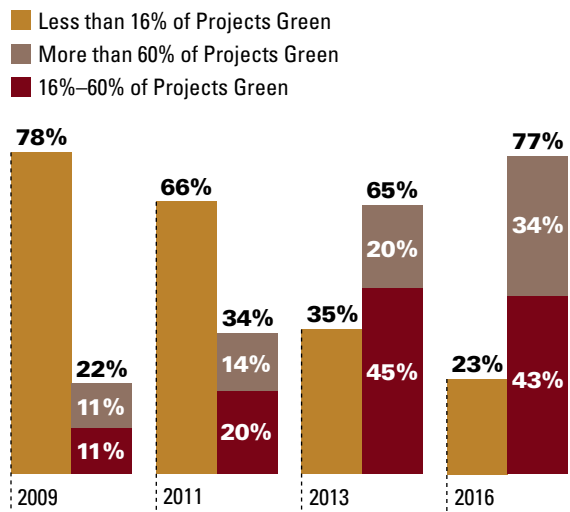
Builders

Source: McGraw-Hill Construction, 2012



Remodelers

Source: McGraw-Hill Construction, 2012



Business Benefits of Green Building

The more green experience firms possess, the greater value they find in green building. While well over a third of builders find that green building has had a positive impact on their company's business, 77% of firms dedicated to green building (90% or more of their projects are green) see a positive impact, and nearly half of them find that benefit to have a significant impact on their firm's business.

Remodelers follow a very similar pattern to builders—33% of all remodelers and 67% of dedicated green remodelers report a positive business impact from green.

More specific business benefits include:

- **Customer Willingness to Pay for Green**
 - Over 60% of builders and remodelers report their customers are willing to pay more for green.
 - Builder and remodeler firms that are dedicated to green building find that their customers on average will pay 6% more a green home, compared to 3% for all builders and 5% for all remodelers.
- **Marketing Advantages**
 - 46% of builders find green homes easier to market than non-green homes.
 - 70% of firms that do more than 60% of their work green, and 71% of dedicated green builders find green homes easier to market.

Evolution of the Green Home

Across all the major green categories other than lot design and development, a significant percentage of home builders and remodelers find improvements in green homes compared to two years ago.

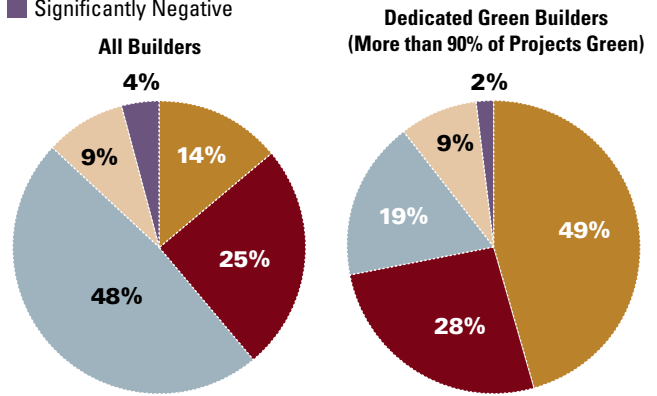
Over 80% find that homes are greener today because of a greater focus on energy efficiency. Government incentives for energy-efficient products and homes, as well as high consumer interest in cost savings, energy independence and reducing greenhouse gas emissions, have contributed to more efficient homes.

Another area that has significantly gained in importance for green homes is improving indoor environmental quality. This may be due in part to greater understanding in the industry and in the consumer marketplace about the health impacts of building materials and practices. For those installing these technologies, 90% consider increased moisture control and ventilation important for achieving a greener home.

Impact of Green on a Firm's Business (According to Builders)

Source: McGraw-Hill Construction, 2012

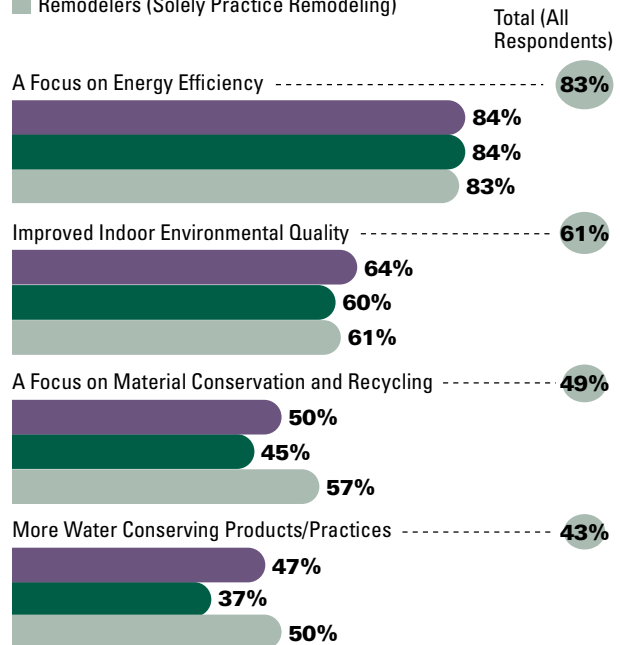
- Significantly Positive
- Positive
- Neutral
- Negative
- Significantly Negative



Features that Contribute to Making Homes Built Today More Green than Two Years Ago

Source: McGraw-Hill Construction, 2012

- Builders/Remodelers
- Builders (Solely Practice New Construction)
- Remodelers (Solely Practice Remodeling)



Recommendations

Different Implications for Different Players

There are a few conclusions evident from the data that can help the players in the green residential market capitalize on the growing green market. Critical trends include the emphasis on home value, the importance of the consumer market and the increase in the business benefits available from green for those with more green experience.

Home Builders and Remodelers

■ Don't be deterred by the appearance of a premium cost for building green.

In today's price competitive housing market, it is hard to compete with higher priced homes. The overall perception by builders and remodelers is that there is a disparity between what it costs to build green versus what customers are willing to pay for it.

However, builders and remodelers with heavy green home experience report cost increases of 5% for green versus customers' willingness to pay 6% more. This suggests that builders experienced in green are either finding more cost-effective ways to build green or are more realistically pricing the costs and communicating value to customers. Less experienced builders can learn from their example.

■ Encourage green home appraisals, and provide a list of approved appraisers to lenders.

Consumers need to see that green is increasing the asset value of their home. Knowing that green homes

will have higher value from an appraisal standpoint will not only enable green home buyers to pay more up front for a green home, but it will also encourage current homeowners to invest in green remodeling projects since those efforts may provide a competitive market advantage if an owner decides to sell.

HOME BUILDERS

■ If you haven't already, now is the time to start adopting green.

The next five years still offer an opportunity to use green as a market differentiator. However, by the time over one third of home builders are dedicated to green projects, it is likely to become a market expectation, especially for higher-end properties (following the trend for Class A office space in the commercial real estate market). Since experienced green builders gain stronger business benefits from their green approach, adopting green earlier will position firms better for the future.

■ Emphasize value when marketing green homes, but be sure to capture other benefits as well.

While cost savings top the list of consumers' priorities, issues such as durable materials that add to the quality and value of the home also are important for home buyers and owners.

Health benefits of green are also gaining increased attention by home buyers.

REMODELERS

■ Be prepared to demonstrate the value of green to customers.

Because remodelers are directly driven by customer demand, they need to be able to demonstrate the value of a green retrofit, such as improved comfort and lower monthly costs.

Building Product Manufacturers

■ Emphasize value.

The survey results demonstrate that both contractors and customers find the value added by green to be compelling, from energy and cost savings to the importance of durable materials. Emphasize in marketing materials how your products contribute to home value.

■ When possible, emphasize any way your products reduce waste.

Waste reduction is highly valued by builders and remodelers. Not only does construction waste reduction figure highly in use and importance for them, but other products and practices that minimize waste, such as durable or prefabricated materials, also rank high in importance.

■ Actively engage the consumer market as well as the contractor market.

The remodeling market in particular is highly influenced by customer demand. A higher level of consumer awareness of the value gained from green products will help increase the demand for green remodeling projects.

Also, providing remodelers with consumer-friendly materials on your products, rather than more technical information aimed at builders, will help them engage better with homeowners.

■ Build relationships with trade associations.

Builders value product information from trade associations more than even from their peers. ■

Data: Introduction

In 2006 and 2008, McGraw-Hill Construction surveyed home builders to gain insight into their level of interest and engagement with the newly emerging trend of green building. The corresponding *SmartMarket Reports* containing the study results revealed a strong shift to green taking place in the residential market. The timing of these reports also corresponded with a seismic shift in the residential construction industry, from the peak of an unprecedented period of growth in new residential construction to its precipitous decline.

Now, as economists begin to forecast a slow but steady recovery from the severe housing slump that has continued since 2008, understanding the role of green is even more crucial as the industry seeks to understand the future opportunity for green home building.

As the recovery begins to take hold, critical questions around the green building marketplace have only gained in importance. Some of the most pressing concerns include: How has green helped the industry weather the difficult economic conditions that have plagued the housing industry as a whole; what do builders—and their customers—truly value in green; and what are likely to be the greatest areas of growth in green? The firms doing green work in 2011 have been practicing green through the most difficult conditions their industry has seen in over 50 years, and their grasp of its benefits and challenges are now enhanced by their experience.

Because the ongoing economic difficulties have altered the residential market, this year's study expands from focusing exclusively on new home builders to include those that conduct remodeling projects as well. While new home construction has been in decline consistently since 2008 according to McGraw-Hill Construction economists, remodeling work has seen significant increases, as people choose to improve the homes they are in rather than attempt to sell in a difficult market. This shift has made remodelers a far more significant factor in residential construction.

The data in this research suggest that during this challenging economic period, green activities and practices have had a positive impact on the business of both new home builders and remodelers. Despite downward price pressures on homes, overall, the data reveal that green has helped builders and remodelers build better homes in difficult times—and stay in business.

Equally importantly, though, the data reveal the high expectations of these builders and remodelers for green in the future, as well as the green practices that they have found in the past to make homes better and those they value for the future. Understanding what builders and remodelers—and their customers—find important and what they see as obstacles to growth is key to the future adoption of green in the residential marketplace, particularly as product manufacturers, service providers, financial institutions, appraisers and suppliers look for the best opportunities.

The analysis in this report explores all these elements according to the various segments of the industry, thereby differentiating the needs and interests of custom builders versus production builders; remodelers versus new home builders; and those more advanced in green work versus those still entering the field. Thus, this portrait of the market offers clear, actionable information about the state of green in residential construction.

Note About the Data

The data in this report are based on an online survey of 416 residential home builders, developers and remodelers, conducted in the fourth quarter of 2011.

Please note that when builders are analyzed by size of firm in the analysis, that determination is based on the number of homes they build per year. When remodelers are analyzed by size of firm, it is based on their annual revenue.

In addition, any data referencing remodeling firms with a high level of green involvement (more than 60% of their projects are green) or dedicated green remodelers (more than 90% of their projects are green) should be interpreted as indicative of trends rather than as statistically valid, due to the small size of this particular sample.

For more information, please see the full methodology on page 56.

Green Booming as the Residential Market Recovers

The residential construction market is critical to the U.S. economy—it serves as a leading indicator of economic health. The last decade will go down in history as the era of the housing bubble that burst and the ensuing recession. At the same time, green home building emerged—and proved resilient in this market, bringing opportunity and optimism. The future only looks bright.

In 2006, new housing activity and house prices reached an all-time high. Yet, by 2008, the bubble had burst. And in 2009, housing starts dropped even further.

During this same period, in partnership with the National Association of Home Builders (NAHB), McGraw-Hill Construction (MHC) released its first research study on the green homes market in 2006 and found that the share of green home activity was 2%.¹ In 2008, that study was updated, revealing an even stronger market despite the precipitous housing decline—increasing both in share (8%) and in value (\$10 billion).²

The Single Family Housing Market

Small gains occurred in the housing market in 2010, attributed to the federal government's short-term home buyers' tax incentive programs, and the slight drop in 2011 reflects this.³

According to MHC's economists and five-year forecast, the economy is improving, and it is expected to begin increasing in 2012, though gradually.⁴ With this improvement and shrinking home inventories, new home building is expected to see steep increases starting in 2014.⁵

The Green Homes Market

At the same time, MHC found that the share of new green homes has grown dramatically.

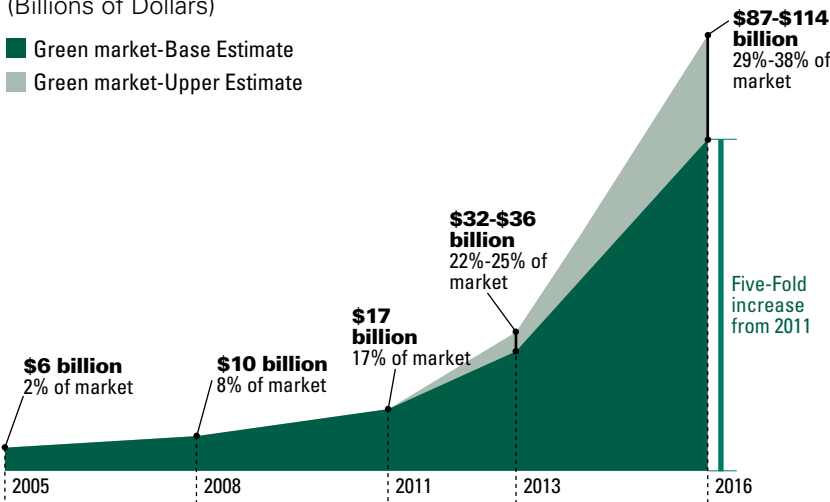
In 2011, it more than doubled in share, rising to 17% of the market, a \$17 billion opportunity.⁶ Future projections look even more promising. MHC estimates that the green share of the market will increase to 22%–25% by 2013—a \$32–\$36 billion opportunity.⁷ MHC expects even more dramatic growth in market share over the next five years, rising to 29%–38% of new homes by value.⁸

The Remodeling Market

While new home building has plummeted, more homeowners have opted to remodel their homes. The Joint Center for Housing Studies (JCHS) at Harvard University reported home remodeling expenditures in 2007 at \$326 billion.⁹ And though it dropped in 2009 to \$296 billion, the remodeling market remained above 2005 levels.¹⁰ The JCHS expects further increases from 2010 to 2015.¹¹

More importantly, future spending should support green growth. Not only do the data in this report suggest a renovation market rapidly shifting toward green, the JCHS has also seen renovation work move to system upgrades and exteriors, elements that can increase energy efficiency, and away from kitchen and bath upgrades.¹² ■

Single Family Housing Green Residential Market (Billions of Dollars)



Source: Green Market Size: calculation McGraw-Hill Construction; base value of construction market from McGraw-Hill Construction Market Forecasting Service, as of February 2012.

MHC defines a Green Home as one that is either built to a recognized green building standard or an energy- and water- efficient home that also addresses indoor air quality and/or resource efficiency.

1 *Green Outlook 2011: Green Trends Driving Growth*, McGraw-Hill Construction, 2010. 2 Ibid. 3. McGraw-Hill Construction, *Construction Market Five-Year Forecast*, through March 2012. 4 Ibid. 5 Ibid. 6 McGraw-Hill Construction, green sizing derived from market research data, market conditions and *Construction Market Five-Year Forecast*, March 2012. 7 Ibid. 8 Ibid. 9 *A New Decade of Growth for Remodeling: Improving America's Housing*, Joint Center for Housing Studies of Harvard University, 2011. 10 Ibid. 11 Ibid. 12 Ibid.

Data: Green Residential Building Market

NEW AND REMODELED GREEN HOMES: TRANSFORMING THE RESIDENTIAL MARKETPLACE DATA

Level of New Green Home Building Activity

Green homes already comprise a significant segment of the new residential construction market, and the share is expected to grow significantly in the next five years.

As shown on page 8, McGraw-Hill Construction's sizing of the green share of single family home starts has shown steady increases since 2005.

Self-reported green activity by builders reflects the same trend. From 2009 to 2011, builders with low involvement in green have dropped from over two-thirds to under one half. By 2013, three-quarters of builders are expected to fall almost equally into the moderate and heavily involved group, and by 2016, half of the home builders anticipate being heavily involved with green construction.

The portrait of green adoption becomes clearer when considering firms fully dedicated to green—those with 90% green projects. These firms are included as part of the “heavy involved” builders (more than 60% of projects green) mentioned above.

- **2011: 17% of builders report being dedicated to green.**
- **2013: 19% expect to be dedicated to green.**
- **2016: 33% expect to be dedicated to green.**

This demonstrates that immediate growth in green will be somewhat moderate, but in the longer term dedicated green builders may overtake the market. The recovery expected in new home construction during this same period further supports a dramatic growth of green.

With housing starts essentially flat between 2009 and 2011, the growth in green involvement demonstrates that green has been one of the few growth areas in the challenging housing market. (See page 8 for more information.) For builders whose new homes must compete for consumer attention with undervalued and foreclosed existing properties, green homes present the opportunity to be competitive by offering the prospect of lower monthly utility bills, better health and higher quality.

These findings also suggest that, even though the share of green has grown in a severely reduced market, the industry believes that the share will become robust as the market recovers.

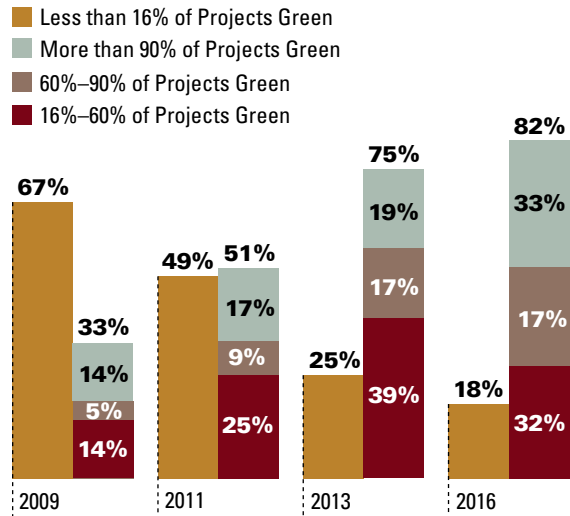
Variation by Size

In 2009, large builders (25 homes or more per year) were far less involved in green than small builders (fewer than 5 homes per year). In fact, over three quarters (79%) of large builders reported the lowest level of involvement

Involvement in Green Activity Over Time

Builders

Source: McGraw-Hill Construction, 2012



compared to fewer than two thirds (65%) of small builders. With new housing starts dropping so much from 2007 to 2009, large builders may have been more cautious in their willingness to change their ways of doing business.

By 2011, the differential in the investment by large builders and small builders disappeared, and the future forecasts also show little variation by size of builder in terms of level of commitment to green. These results correspond to the findings that a bigger percentage of large builders find that green has had a positive impact on their business compared to small firms. (See page 16 for more information.) This demonstrates that as firms have seen their investment in green pay off, especially during such a difficult market, they have become more committed to green.

Variation by Region

In general, the Northeast has a lower percentage of firms doing largely green work (more than 60%) than other regions. By 2016, only 40% of firms working in the Northeast expect to practice that level of green construction.

Currently, about one third of the respondents are doing at least a moderate level of green remodeling projects (16% or more). However, by 2016, over one third (34%) expect to be heavily engaged in green projects (more than 60% of total work). This shift demonstrates a strong long-term positive forecast for green remodeling and suggests that green has begun to emerge as a normal remodeling practice.

As with new building, there is a dramatic drop between 2009 and 2011 among those with low involvement, leading to a majority of the market engaging in green at a more substantial level. Green has grown more accepted by the general public since 2009, and homeowners, while impacted by the recession and its aftermath in their spending, have been in a position to demand more from their projects. This conclusion is supported by the data—remodelers report that high levels of homeowners are demanding improvements that would lower their energy use and save them money (see page 24). Additionally, remodelers report their customers would pay more for these features (see page 19), underscoring the value homeowners are placing on their green investments.

Remodelers Compared to New Builders

Green remodeling activity lags behind new green construction, both now and in expectations for the near future. However, remodeling growth is occurring at a more dramatic rate.

The current lag is particularly notable when comparing the level of green involvement of firms solely engaged in remodeling—rather than those that do both new homes and remodeling (shown in the top chart at right)—versus builders that solely build new homes. 29% of remodelers expect to be doing primarily green work in 2016, compared to 50% of new builders.

One factor that may contribute to the current lower level of green work among remodelers is the extent to which residential remodeling projects are driven by customer demand. A new home builder has an easier time helping drive the market to green—either through marketing efforts or folding green in as a standard practice. However, homeowners more directly influence their remodeling efforts, making it more difficult for the remodeler to influence their choices.

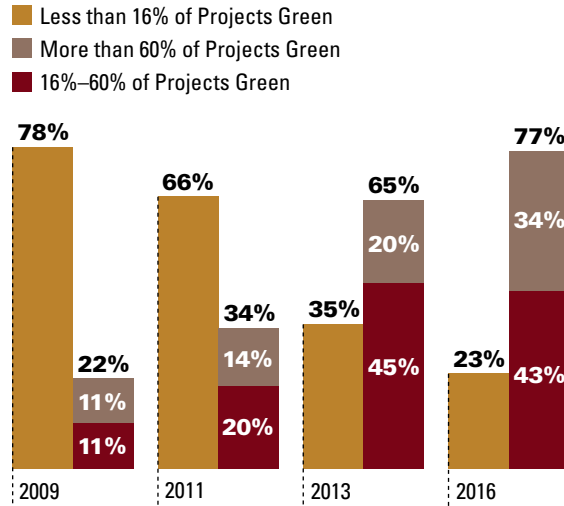
Despite these lower current levels, remodelers are increasing their involvement in green at steeper rates compared to builders, suggesting that the green share of remodeling activity could overtake that of new homes.

Level of Green Remodeling Activity

Involvement in Green Activity Over Time

Remodelers

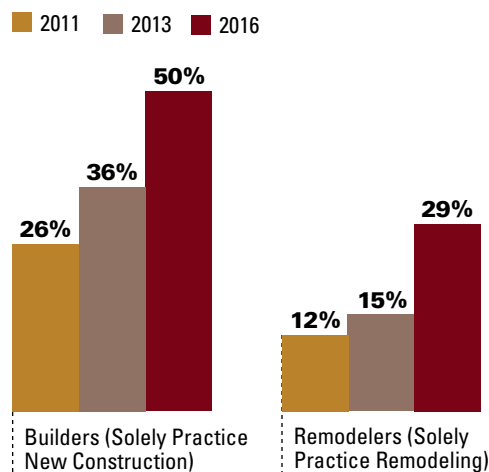
Source: McGraw-Hill Construction, 2012



Firms Highly Involved in Green Projects

(More than 60% of Total Projects Are Green)

Source: McGraw-Hill Construction, 2012



Interview: Thought Leader



Don Ferrier

Don Ferrier, president of Ferrier Builders, Inc. and Ferrier Custom Homes, represents the third generation of the Ferrier family in the quality construction business. A recognized leader in the green home building field, Don was a founding member of Green Built North Texas and serves on the NAHB's Green Building Subcommittee Board.

What did you do early on in green building?

FERRIER: In 1986 we started building with structural insulated panels and [achieved] significant energy savings [on a house] that was very traditional looking. And bankers had no problem with it. The cost point was still higher than your average home, but the benefits were [obvious].

What do your customers want?

FERRIER: Historically, our clients have been predominantly Baby Boomers and wallet-driven. People say, "I know your home's going to cost us more, but we believe it's going to be one of the wisest investments we could make." They'll pay more up front to have something that uses a third or a fourth of the energy than a conventional house because of their fear about energy prices.

And then, interestingly, the younger generation—around 32 to 40 years old—has gained market share with us. The younger group is saying, "This is something that is the right thing to do for us, our kids, our grandkids and the planet."

Do you think green building has helped builders stay in business during the recession?

FERRIER: Out of the years of the downturn, which really started in 2008, we've had good years except one—and even that was primarily a happy year. But I belong to both the Dallas and Fort Worth builders' associations, and I could give you a long

list of folks who haven't built a home since 2007.

Do you think green will continue to be a growth opportunity when the market improves?

FERRIER: I think it'll do nothing but pick up. There are [potential clients] that tell us they are waiting for their stock market funds to come back up. So that tells us that there is a [market waiting] to move forward [once the economy improves]. They don't want to do it halfway.

Do you think you will continue to be innovative and push green further?

FERRIER: That's something that has kept us in the forefront. We love to be researching better ways to do things.

Every home we've ever had certified has been LEED Platinum and now Green Building Standard Emerald. I had a writer ask me why I never built average homes. And I said, "I think I would have quit and done something else." Building something that was an energy hog and wasn't healthy and helping the environment never appealed to me.

How receptive are home buyers to renewables?

FERRIER: With the Baby Boomers, every one of them want it when they come to me, but the difficult thing is that they have a list of 50 things they want. I ask, "Any idea what your budget is?" And I can probably get 30 of those 50 in that budget.

But we do see movement in [the renewables market]. The vast majority of people who want it don't realize how long of a payback it is and how much it's going to add to the cost.

I [liken it to] the old U.S. Department of Agriculture food pyramid. At the base, you eat your fruits and veggies and whole grains. In the middle, you have meat and dairy. And then at the very top, a little bit of sugar.

It's really the same thing in the homes we build. The bottom is what we do on every one. We're in a hot climate, so #1 for extreme energy efficiency is controlling the hot summer sun, #2 is to make it as airtight as possible, and #3 is to insulate, and ... in our climate, that's more important in the roof than in the walls. So, that's the base. Then, the middle is to do more, such as going to a tankless water heater or up to a 16 or 18 SEER air conditioner. Then, at the very top is your wind and photovoltaics. So we're always telling clients, let's make sure we have the first two levels. Then, let's decide what makes sense to do at the top level. We have been making homes solar-ready for years. That way, if they want to do it in the future, they can.

What would you tell a new builder who's interested in getting involved in green building?

FERRIER: You've got to educate yourself in basic building science. And I think the green building certification process is a wonderful education tool. Even we are still learning. ■

Achieving Zero Energy—Combining Bottom-Line Benefits with Sustainability

Zero Energy Casita
FORT WORTH, TEXAS



Old barn wood was reclaimed and reused in the sustainable kitchen.

The owners of this custom home were focused on saving money, especially by keeping energy costs low.

However, several project factors began to align with a more holistic sustainability approach. For example, the owners decided on a home with a rustic aesthetic, which naturally tied to the use of reclaimed wood materials. Additionally, the site had little obstruction and a

regular breeze, making wind energy a viable option—particularly given the tax incentives encouraging such investment.

This project demonstrates how a home originally planned around energy efficiency could become net-zero energy and truly sustainable. ■

Project Facts

Builder

Ferrier Custom Homes

Architect

Bundy, Young, Sims & Potter, Inc.

Type of Project

New single family home

Build Date

2010

Size

1,015 sq.ft.
2 bed/ 2 bath

Certifications

- LEED for Homes Certified—Platinum
- NAHB Research Center Green Certified—Emerald
- Energy Star

Project Features

- Infill and previously developed lot
- Skystream wind turbine
- Structural insulated panels wall and roof
- Weathershield Zoe-5 Low-E Energy Star windows
- Reclaimed barn siding, fascia and beams
- Reflective metal roof with vent space underneath
- Tankless water heater
- Low flow plumbing fixtures
- Ultra low flush toilets
- PEX plumbing
- Reclaimed wood flooring
- Termimesh chemical-free termite barrier
- Low VOC paints, stains and adhesives
- Formaldehyde-free cabinets
- Energy Star appliances
- High-performance Carrier air conditioning with programmable thermostats
- All ducts located within conditioned space
- Enhanced indoor ventilation with Energy Recovery Ventilator
- HEPA air filtration system
- Central dehumidification
- Passive solar orientation
- Permeable drive
- Nontoxic pest control
- Native landscaping
- Construction debris recycling
- Tree protection to ensure survival of all existing trees

Restoring an Historic Home— Blending Sustainability with Preservation

Heather's Remodel FORT WORTH, TEXAS



New balcony adds outdoor living space without increasing the home's footprint.

Heather Ferrier Laminack had lived in a new home certified at the highest levels of green, but she wanted to apply the lessons involved in building that home to restore a neglected, historic one.

Overhauling a Home

Staying true to the original layout and charm, while transforming it into a highly efficient and healthy

home, proved to be a tremendous undertaking.

With millions of existing homes in the U.S. in needs of improvement and repair, this project—at under \$100,000—demonstrates the depth of green that can be achieved, even in a home needing a complete remodel. The result speaks to the success of the project—scoring at the Emerald level with NAHB Research Center's online scoring tool and yielding a truly sustainable home. ■

Project Facts

Builder

Ferrier Custom Homes

Age of Home

- Built: 1938
- Project start: July 2010
- Move-in date: December 2010

Size

3 bed / 1.5 bath
Same footprint as original home, slightly smaller living space but added outdoor square footage

Awards

2011 NAHB Green Building Award—Best Green Remodel Under \$100,000; 2012 Gold Energy Value Housing Award—Remodel in Hot Climate

Project Features

- Icynene spray foam insulation in attic and wall cavities
- Replaced all windows with Maritech triple Low-E coating, Energy Star windows
- Daikin mini-split AC system downstairs; Mitsubishi unit and blowers for upstairs
- Programmable thermostats
- Tankless Seisco water heater
- Energy Star doors
- Energy Star lighting
- Energy Star appliances
- PEX plumbing
- Low flow showers, faucets and dual-flush toilets
- All low or no VOC paints, stains and adhesives
- Restoring original hardwoods, door hardware, bathroom fixtures and Ventahood
- Removing and reusing lumber, siding, etc.
- Mulched scrap lumber for use in landscaping
- Open front porch restored to assist with ventilation and delay the use of AC
- Increased outdoor living space
- Native landscaping
- Rainwater collection barrels at downspouts
- Donated unused items to Habitat to Humanity (doors, plumbing and electrical fixtures)

Project Partners

- George Arnold Painting & Framing
- DeFord's Windows & Doors
- MK Roofing
- Wolverton Air
- Double L Plumbing
- Fox Electric
- Comfort Savers Insulation

More than 50% of builders expect increasing green opportunity in all regions across the country.

This widespread expectation demonstrates that engagement with green is nationwide rather than confined to certain regions, even if some regions have stronger forecasts than others.

REGIONS WITH THE GREATEST OPPORTUNITY

A large percentage of respondents expect increasing green opportunities in the Pacific and West North Central regions.

■ **Pacific (AK, CA, HI, OR, WA)**

Over 80% of builders and remodelers anticipate increasing green opportunity in the Pacific region, which suggests that the steady focus on green policies in states like California, Oregon and Washington can directly impact the market.

■ **West North Central (IA, KS, MN, MO, NE, ND, SD)**

Over three-quarters of builders and remodelers also see green opportunities increasing in the West North Central region. The wide temperature ranges experienced in this region may lead to greater interest in energy efficiency in both heating and cooling systems. This result suggests that green need not be driven solely by progressive policies. Instead, business factors, such as return on investment and quality, can also increase green activity.

Variation by Type of Firm

For most of the other regions, more builders report an increase in green opportunity compared to remodelers. This general trend supports the data on the lower level of green adoption among remodelers (see page 10). The only region where remodelers see more opportunity than builders is the East North Central (IL, IN, MI, OH, WI).

REGIONS WITH THE LARGEST GAP BETWEEN BUILDERS AND REMODELERS

■ **Mountain (AZ, CO, ID, MT, NV, NM, UT, WY)**

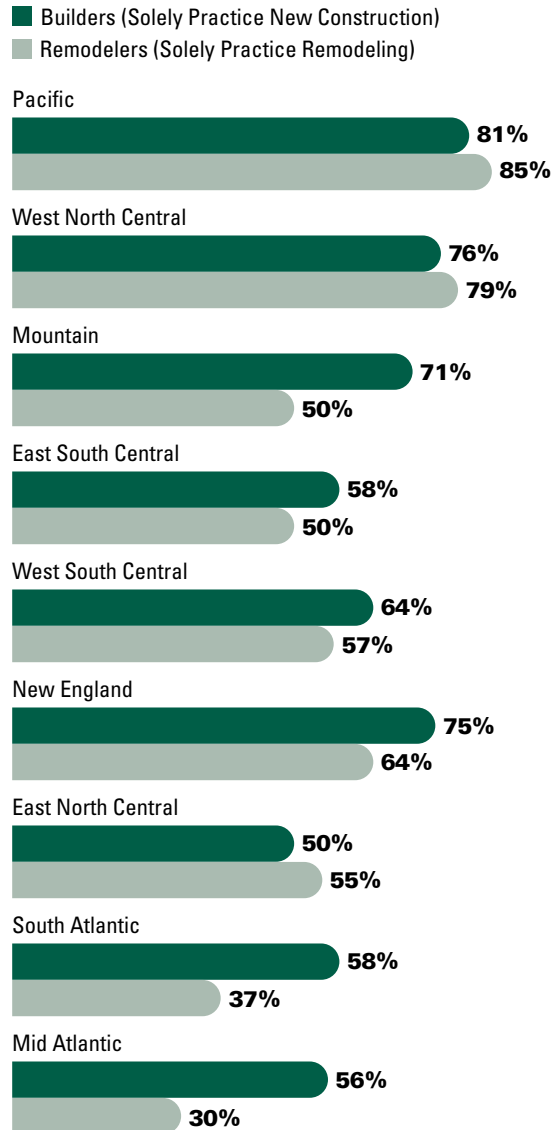
■ **South Atlantic (DE, DC, FL, GA, MD, NC, SC, VA, WV)**

■ **Mid Atlantic (NJ, NY, PA)**

According to S&P/Case Shiller Home Price Indices, the Sunbelt states like Arizona, Nevada and Florida put a premium on new home construction, and through the downturn, they have also seen some of the largest declines in home value.¹ This reduces homeowners' ability to use the equity in their homes to finance

Regions With Increasing Green Building Opportunity (Builders versus Remodelers)

Source: McGraw-Hill Construction, 2012



remodeling projects, as well as their expectation that home remodeling will sufficiently increase the value of their homes to justify investment. The lower expectations for green remodeling opportunity may reflect larger concerns about these remodeling markets in general.

S&P/Case Shiller Home Price Indices: 2010 A Year In Review, January 2011. <http://www.standardandpoors.com/indices/sp-case-shiller-home-price-indices/en/us/?indexId=spusa-cashpidff-p-us--->

Impact of Current Economic Climate on Amount of Remodeling Work

NEW AND REMODELED GREEN HOMES: TRANSFORMING THE RESIDENTIAL MARKETPLACE DATA

58% of remodelers report that they are doing more remodeling work as a result of the current economic climate. With the current market conditions severely hampering new home construction (see page 8), it is not surprising that 62% of the firms who do both new homes and remodeling projects report an increase in their remodeling work.

However, the increase in remodeling work is not confined to firms no longer building new homes. The market has increased across the board. Over half (55%) of the firms solely practicing remodeling also report an increase in their work due to the current economy.

Several types of legislation have encouraged investment in home remodeling projects—most oriented around energy efficiency. The American Recovery and Reinvestment Act included many initiatives that encouraged home remodeling, including significant investment in home weatherization. In addition, substantial rebates for energy-efficiency practices, including more efficient

HVAC and hot water heaters, have been made available, encouraging homeowner investment.

Though these result may suggest that when the market improves, the builder/remodeler firms will return to new home construction, the experience and business growth these firms have realized by shifting to remodeling activity may encourage them to continue with their renovation work. The result could change the competitive landscape for remodelers. With new home builders more aware of green practices, this could also pressure remodelers to increase their green practices more rapidly.

There is no statistically significant variation in the impact of the economy on the level of renovation work by region, size of firm or the number of projects undertaken. This demonstrates the pervasive impact of the economic downturn on the residential market. However, if regions recover at different rates, the percentage of builder/remodelers that transition back to a focus on new building may see significant regional variation.

Incentives and Mandates for Green Residential Construction

Two-thirds of the builders and remodelers surveyed indicate that government incentives and changes in codes, ordinances and regulations are important triggers for them to build green. These incentives and mandates have been growing for the last few years, especially for energy efficiency, but they now face the challenge of increasing concerns over the federal deficit and decreasing state and local revenues.

With the funding from the American Recovery and Reinvestment Act (ARRA) winding down and the tax credits for the construction of new energy-efficient homes and appliances ending at the end of 2011, investment by the federal government to encourage residential energy efficiency appears to be on the decline. However, as the “Better

Buildings Through Executive Action” report issued in January 2012 by the U.S. Green Building Council summarizes, there have been other initiatives to encourage green and energy-efficient construction, especially for affordable and multifamily projects.

- **Fannie Mae’s Multifamily Green Initiative: Fannie Mae is partnering with the Federal Housing Administration and the Environmental Protection Agency to provide competitive financing for green homes and to develop an energy performance rating system.**
- **Existing programs to provide funding for affordable housing from USDA and HUD now include energy efficiency and sustainability criteria in their evaluation process. HOPE VI housing regulations are also**

incorporating new or stronger energy-efficiency requirements.

State and local initiatives for energy efficiency funding are still going strong. The Database of State Incentives for Renewable Energy, which also tracks energy efficiency funding by state and local government as well as utilities, lists well over 750 financial incentives offered in all 50 states.

In addition, many local communities continue to pass legislation encouraging green residential construction. Some examples include: mandates demanding green elements in all new homes in Culver City, CA, and Mountain Village, CO; financial incentives for achieving green certification in East Lansing, MI; and expedited permitting and waived permitting fees in Jacksonville, FL.

NEW AND REMODELED GREEN HOMES: TRANSFORMING THE RESIDENTIAL MARKETPLACE DATA

Impact of Green on Firms' Business for Builders

39% of builders believe that green has had a positive impact on their overall business despite this current real estate market. Over one-third of that 39%—or 14% overall—believe the impact is significantly positive.

Green offers the opportunity for builders to differentiate themselves and their homes. This competitive advantage is critical in a highly competitive market that currently has a large inventory of existing and foreclosed homes creating downward price pressures. In particular, the association of green with quality homes, which emerged as a factor in the 2008 *Green Home Builder SmartMarket Report*, is still evident in the result of this current study; for example, better quality is the most frequently selected trigger for new green home building (see page 25). As the market recovers, green may become even more important, since it may have become a market expectation during the downturn when green grew as a share of activity.

Variation by Level of Green Involvement

The more involvement and experience builders have with green homes, the more positive impact they find building green has on their overall business. 77% of the dedicated green builders (over 90% green homes) report the positive impact of green, and nearly half (49%) report that impact as significantly positive.

Conversely, only 18% of those with little green involvement report a positive impact from green on their business. It is worth noting that by far the largest percentage of these firms (62%) see no impact from green at all. This neutral position suggests that lack of experience, rather than a resistance to green, may contribute to their low levels of green involvement.

Variation by Firm Size

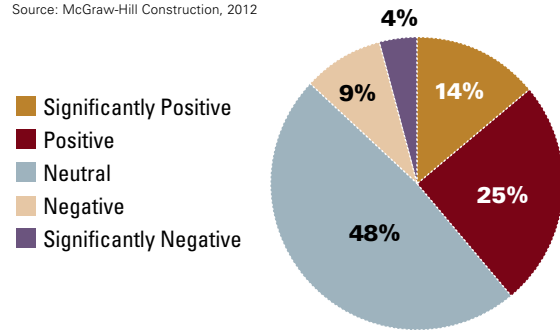
45% of large builders (25 homes or more per year) find that green has a positive impact on their business, including 23% noting the impact as significantly positive. Larger firms have more resources to capitalize on the differentiation green homes offer through marketing, which may help account for the higher number reporting a significantly positive impact.

Variation by Region

61% of the firms working in the Midwest report that green had no impact on their businesses, 13% more than in the South and more than 20% more than in the Northeast or West.

Impact of Green on a Firm's Business (According to Builders)

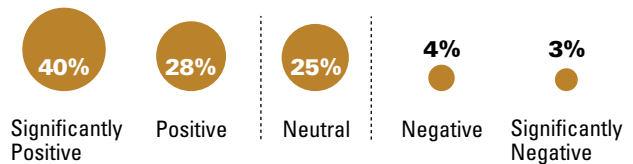
Source: McGraw-Hill Construction, 2012



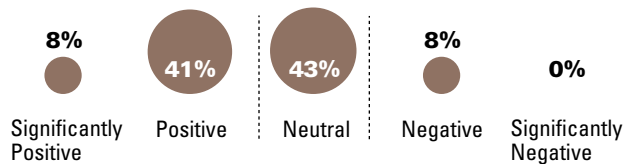
Impact of Green on Business for Builders (By Involvement with Green)

Source: McGraw-Hill Construction, 2012

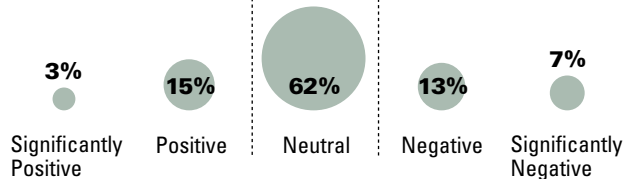
High (61%+) Percentage of Green Buildings



Medium (16% to 60%) Percentage of Green Buildings



Low (0% to 15%) Percentage of Green Buildings



One-third (33%) of the remodelers believe that doing green work has a positive impact on their business.

While this is a lower percentage than the builders who report a positive impact from green, the difference lies in an increase in those who are neutral. In fact, slightly fewer remodelers than builders note a negative impact from green.

This result suggests that there is a portion of homeowners that could be seeking out or asking about green features, and, therefore, generating more advantage to firms offering green services. The extremely small percentage of remodelers reporting green as a negative impact on their business suggests that for remodelers, either green projects are helping their bottom line or having no impact on it.

This is supported by the fact that there is no significant difference by size of firm for remodelers, unlike the builders. Issues like having the resources to engage in green marketing have less impact on the remodelers' business than they do for builders, which is indicative of a more consumer-driven market.

Variation by Level of Green Involvement

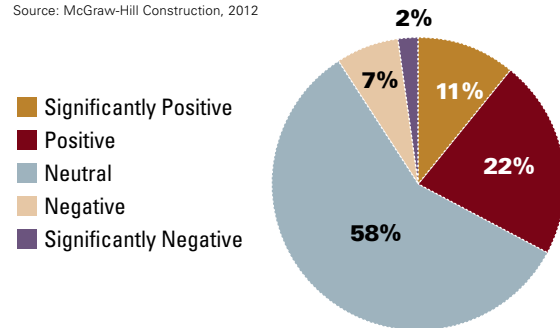
Similar to the builders, remodelers who have more involvement and experience with green projects report that green has a greater positive impact on their bottom line than those with less involvement.

- **High Green Involvement (more than 60% of their projects): 50% find that green work has a significantly positive impact on their business, an even higher percentage than the builders (40%) with the same level of green involvement.**
- **Medium Green Involvement (16%–60% of their projects): Although only 10% see a significantly positive impact, another 49% report a positive impact.**
- **Low Green Involvement (0%–15% of their projects): 71% do not find any impact on their business from green, positive or negative.**

Again, these findings suggest for some remodelers, green is creating new opportunities, but that those who are not engaged in those opportunities have not been able to reap the same rewards.

Impact of Green on Firms' Business for Remodelers

Source: McGraw-Hill Construction, 2012



Average Cost to Incorporate Green Features and Practices in New Homes and Remodeling Projects

Most builders and remodelers report an increased cost to building green.

- **Builders—7% incremental cost increase**
- **Remodelers—8% incremental cost increase**

Comparison of these results with the studies conducted in 2006 and 2008 by McGraw-Hill Construction suggests that greater familiarity with green reduces the increased cost experienced by builders. In 2006, builders perceived the average cost to build green to be 11%, and in 2008, it was 10%. Factors such as the increased number of green products and higher levels of experience of builders with green construction methods have led to a significant drop in the expected premium to build green.

Variation by Level of Green Involvement

The findings for those heavily involved in green also support the conclusion that experience with green building reduces the cost of building green.

- **12% of dedicated green builders (90% of their projects or more) report no additional cost to building green, compared to 2% or less of the other groups.**
- **The average increased cost for green expected by dedicated green builders is 5%, compared to the 7% average.**

The dedicated green remodelers trend similarly to the green builders, with their average expected cost increase for green also at 5%.

Variation by Firm Size

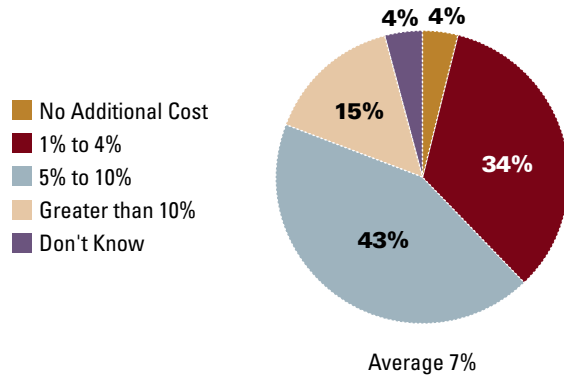
BUILDERS

The average increased cost of building green for large builders (those that build more than 25 units per year) is 5.6%, significantly less than for other builders, especially the small custom builders doing 4 homes or less per year, which average 7%. One reason may be larger builders' ability to take advantage of the economies of scale in their purchases of green building products, resulting in lower overall costs.

However, there are a very small number of small builders (4.4%) that report that green involves no extra cost. None of the large builders report the same. There may be custom home builders who specialize in relatively expensive homes with higher-cost materials, and a builder

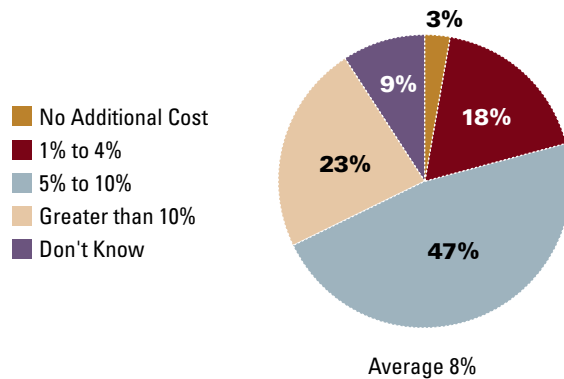
Incremental Cost of Incorporating Green Features and Practices (New Construction)

Source: McGraw-Hill Construction, 2012



Incremental Cost of Incorporating Green Features and Practices (Remodeling)

Source: McGraw-Hill Construction, 2012



using premium products throughout is less likely to have a cost differential for green products.

REMODELERS

Remodelers doing over \$1 million worth of work found the average green premium to be 8.7% over project cost, slightly higher than smaller remodelers, who report a 7.9% premium. Unlike large builders, whose similarity of work allows for economies of scale, remodelers are more likely to buy their products project by project, preventing larger remodeling firms from having the same kinds of bulk purchase benefits large builders can obtain.

61% of builders and 66% of remodelers report that their customers will pay more for a green home or remodeling project. Though small, this is an increase over the 58% of builders in the 2008 study that reported the same. Given the downward pressure on housing prices, high unemployment and increasing standard of living costs, this increase is notable. Despite strong economic pressure, green has increased in value to consumers.

Remodelers generally find customers more willing to pay for green compared to builders—and willing to pay higher amounts. The percentage of remodelers that believe customers will not pay extra for green is 18%, much lower than builders (30%). In addition, the average additional percentage that customers are willing to pay for a green remodeling project is 5%, two and a half times the 2% more that builders report their buyers will pay.

A few factors may account for greater willingness to pay for green by remodeling customers. First, the remodeling market is not directly impacted by the price pressures felt in the new home market. Second, customers who decide to incorporate green features in remodeling projects may be more active in the decision to take a green approach than those shopping for new homes, which suggests that when consumers recognize the value of green, they are willing to pay more for it.

Variation by Level of Green Involvement (Builders)

Dedicated green builders (over 90% of their homes are green) report that their customers are willing to pay an average of 6% more for a green home than a non-green home, compared to 4% for builders with a medium involvement and 2% for those who have a low involvement with green home building. This is particularly significant since these same builders report that green only costs them 5% more (see page 18), so they are actually finding that green is leading to higher profits.

Variation by Region

A higher number of builders in the West (12%) and Midwest (10%) believe that customers will pay 10% or more for a green home compared to a non-green one, compared to the Northeast (3%) and the South (4%).

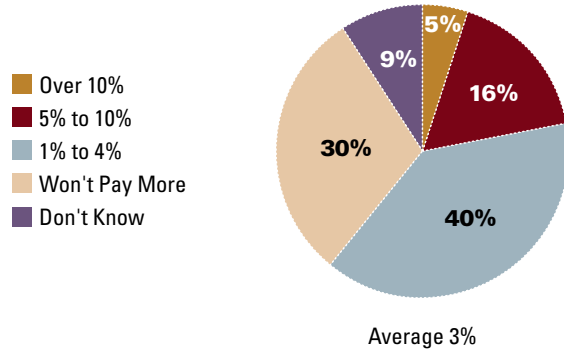
Variation by Firm Size

Smaller builders (4 or less homes a year) and remodelers (annual revenue under \$500 million) are less familiar with what customers are willing to pay for green compared

Willingness of Customers to Pay for Green

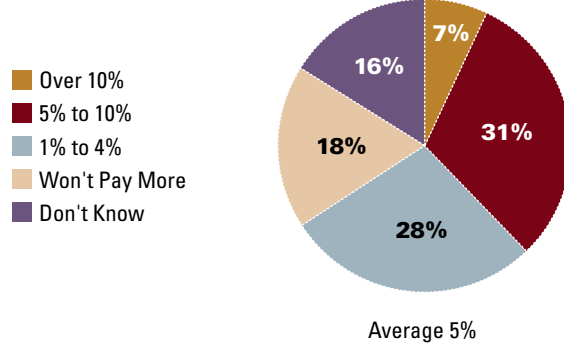
Additional Amount Customers Are Willing to Pay for Green
(According to Firms Doing New Construction)

Source: McGraw-Hill Construction, 2012



Additional Amount Customers Are Willing to Pay for Green
(According to Firms Doing Remodeling)

Source: McGraw-Hill Construction, 2012



to larger firms. In fact, nearly one-quarter (24%) of small remodelers do not know how much their customers may be willing to pay, much higher than the 18% average.

BUILDERS

Nearly all large builders (more than 25 homes per year) have an estimate for how much their customers are willing to pay for green, averaging 2%. The high level of response to this question by large builders suggests that they actively track these figures. 38% also report that their customers won't pay more for green, significantly more than small builders. Production builders may be more strongly affected by current housing price pressures created by foreclosed homes compared to custom builders, which have more direct customer engagement.

NEW AND REMODELED GREEN HOMES: TRANSFORMING THE RESIDENTIAL MARKETPLACE DATA

46% of builders with revenue of \$1 million or more find marketing green homes easier than marketing non-green ones. Issues such as quality, improved health, better investment and lifecycle cost savings all offer differentiation for green homes, particularly important in this highly competitive market.

Comparison to the results in the 2008 *Green Home Builder SmartMarket Report* suggests that builders have become more familiar with marketing green homes and have stronger opinions about whether or not having a green home makes it easier to market. This is supported by the fact that far fewer respondents in this study report a neutral position.

The perception of green homes as higher quality homes may contribute to the ease or difficulty of marketing them. While the public's understanding of the value of green continues to grow, a green home may also be perceived as more expensive. In a marketplace with persistent downward pressure on home prices, any factor that makes a home appear to be more expensive may work against it, regardless of the benefits and energy savings associated with green. Therefore, while green is recognized as a valuable differentiator by many, it is also perceived as a challenge by other firms. This result suggests that the market for green will likely continue to grow as the downward price pressure on homes diminishes.

There is also no variation by region in terms of the perceived ease of marketing green homes. Between 41% and 48% of respondents in all regions note that green homes are easier to market. This may reflect a nationwide interest in and adoption of green.

Variation by Level of Green Involvement

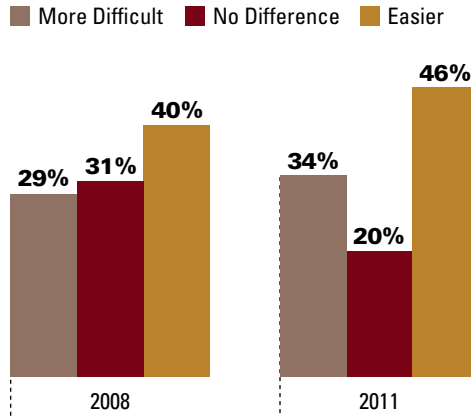
It is not surprising that firms who build a large percentage (more than 60%) of green homes find it easier to market them. However, the disparity is extremely significant—70% report it being easier to market green compared to only 48% overall.

It is clear that experience with green makes it easier to differentiate green homes from others in the market, most likely because the increased familiarity with green products and practices makes communication about them and the associated benefits more effective. These experienced green builders may also have case study examples they can share with customers, which are more compelling to a buyer than unsubstantiated statements.

Ease in the Marketing of Green Homes

Ease in Marketing Green Homes in the Current Economy (by Year)

Source: McGraw-Hill Construction, 2012

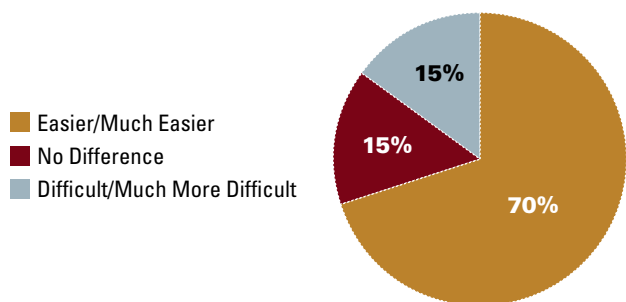


*2008 data from the 2008 *Green Home Builder SmartMarket Report*. Please note that in 2008, respondents were asked about ease of marketing in a down economy, rather than the current economy.

Level of Ease in Marketing Green Homes

(According to Builders with more than 60% Green Homes)

Source: McGraw-Hill Construction, 2012



The Challenges of Green Affordable Housing

The positive financial impact of green affordable housing on its occupants is proportionally greater than the impact of green for those in higher income brackets. To encourage more green activity in the affordable housing market, firms must be aware that the triggers and obstacles for greening these properties, while the same as for the rest of the housing stock, carry greater weight.

With over 17% of households paying more than half their income for housing, the availability of more affordable housing continues to be a challenge for homeowners and renters alike.¹ For lower-income occupants, the benefits of green housing, such as lower utility bills and increased health, make a far greater impact financially since these factors also account for a larger share of household funds than for those in higher economic brackets.

Growing Need for Affordable Housing

Despite the decline in home prices due to the number of foreclosures and distressed sales, the latest Harvard University Joint Center for Housing Studies (JCHS) *State of the Nation's Housing* report reveals that there is still an acute affordable housing shortage for homeowners and renters alike. Not only has the gap between the number of households seeking affordable housing and the amount of affordable housing available increased significantly in the last decade, but the problem with finding affordable homes has moved up the income scale.

Over one quarter (27%) of households earning \$15,000–\$30,000 are severely burdened with housing costs—paying at least half of their income on housing—as well as 11% of those earning \$30,000–\$45,000. The percentage of those earning

\$45,000–\$60,000 per year who are considered severely burdened, while small, has doubled since 2001 to 6.4%.² All of this demonstrates that, with the need for affordable housing continuing to grow, particular attention needs to be paid to greening those homes.

Impact of Market Factors on Green Affordable Housing

Paul Emrath, vice president of survey and housing research at the National Association of Home Builders (NAHB), argues that the same factors impact the greening of affordable homes as any other kind of housing, including the need to have home appraisals reflect the added value of green and the concerns over additional upfront costs to incorporate green. The difference he notes when it comes to affordable housing is the scale of these issues: “All of these things are a more serious problem at the affordable end of the spectrum... The further you go down the price scale, the more these things become deal breakers.”

Kermit Baker, a senior research fellow and project director of the Remodeling Futures program at JCHS, finds competing market forces impact green renovation projects for affordable homes. On the positive side, he notes, “There is growing concern over energy costs ... and more awareness and sensitivity to green-related issues among the emerging generation of home buyers.”

On the other hand, Baker sees a general reduction in discretionary remodeling projects due to growing concerns about the ability in this market to recoup the investments. Also, he has observed a drop in green remodeling work in 2011 due to the reduction in the energy tax credit, and he expresses concern that, now that the credit has fully expired, levels will drop even further.

Encouraging Growth in Green Affordable Housing

Baker argues that, to encourage green in affordable housing, “Ultimately it needs to be embedded in the building codes ... Until it is standard building procedure, I think it is going to be a struggle,” even with some remaining financial incentives and changing consumer attitudes.

Emrath cautions, though, that building codes that mandate green need to be flexible or they will price out the affordable market entirely. He also believes that cities need to take a holistic approach to their codes: “We [at NAHB] have estimated that regulation accounts for 25% of the cost of a new home, so you have to be really careful that you don’t squeeze out green with some other kinds of regulation.”

Instead of mandates for specific green products and services, he argues that an open, competitive market process for green products would lower costs, making them more viable for inclusion in green affordable projects. ■

1 Harvard Joint Center for Housing Studies. The State of the Nation's Housing 2011. June 2011. <http://www.jchs.harvard.edu/research/publications/state-nation%E2%80%99s-housing-2011>. 2 Ibid

Bringing the Outside In— Green Multifamily Housing

TEN23 Apartment Building NEW YORK, NY



The façade of the TEN23 apartment building is a combination of poured-in-place ornamental concrete and sophisticated, highly insulated glass.

NEW AND REMODELED GREEN HOMES: TRANSFORMING THE RESIDENTIAL MARKETPLACE

stats

Project Facts

Type of Project

New Multifamily Project

Location

New York, NY

Size

97,000 sq. ft. over 5 stories

Construction Cost

\$260/sq.ft.

Units

111 total units

- Studios: 414–512 sq.ft.
- 1-bedroom: 642–763 sq.ft.
- 2-bedroom: 862–1,339 sq.ft.
- 3-bedroom: 1,128–1,334 sq.ft.

Opening Date

January 2012

Certifications

Applied for NAHB Research Center Certification at the Silver level

Through its initial design and approval process, the TEN23 apartment building was not necessarily going to strive for a green approach. However, when the original developer was forced to sell the project, Equity Residential, the new owner and developer, made greening the building a priority. The building, however, had already received many of its approvals through a complicated zoning process, and foundation work on the site had started. Despite these challenges, the building is currently on track to achieve Silver certification under the ICC 700 National Green Building Standard.

Taking a Green Approach

In order to achieve its green goals within these limitations, Equity kept the original design team,

but also brought in Performance Path Solutions, a green consulting firm specializing in residential construction. The team as a whole conducted a thorough project review with Performance Path Solutions specifically looking for green opportunities.

Mike Kochanasz, a partner in Performance Path Solutions, says, “Commitment on the part of Equity to do [TEN23] as a green project spearheaded the whole effort.” He also credits Equity with fostering a strong team environment: “They were very conscious of involving everyone in the process, and we found that to be very helpful.”

Michael Fontaine from Gerner Kronick + Valcarcel Architects, the project architect for TEN23, also noted the extra investments Equity was willing to make, since not only

TEN23 Apartment Building NEW YORK, NY

was it developing the project but also anticipated being the owner for a long time. One specific example of Equity's high commitment to green goals was its willingness to use a "space-age" insulating glass for the windows that comprise approximately 30% of the façade. He explains that Equity recognized that, by making this investment, it would have a building that "would be easier to maintain, last longer, look better and feel better."

Green and Unique Elements of the Project Inside Out/Outside In Design

Fontaine views the connection between the interior and the exterior of the building as a critical green element. The investment in the highly insulated windows is part of an overall strategy to emphasize daylighting. In addition to helping with building energy performance, they are "half veiled and half clear so the units get a tremendous amount

of natural light while still being fairly private, says Fontaine.

Use of Ornamental Poured-in-Place Concrete

The building also eliminated the need for a brick or glass veneer by using ornamental, poured-in-place concrete. While this practice is more commonly used in countries like Germany and Japan, Fontaine credits it with saving time and money.

Multifamily Green Homes

In many ways, the project was more similar to a commercial construction project than a residential one. Kochanasz noted several differences, such as the need to do window framing and glazing on site and the similar interior products and features.

He also points to advantages in the green certification process: "There was a person on the general contractor staff responsible for securing all documentation, which doesn't usually happen on a single-family project." ■



The building design and materials help bring the outside in, enabling significant natural light to reach apartment interiors.

stats

Project Players

Owner

Equity Residential

Architect

Gerner Kronick + Valcarcel Architects

Structural Engineer

WSP Cantor Seinuk

Construction Manager

Ryder Construction, Inc.

Green Consultant

Performance Path Solutions

Project Features

Energy-efficient Lutron lighting controls and occupancy sensors

Energy-efficient lighting and fixtures by Zumtobel Texas Fluorescents, Illuminating Experiences, BEGA, Selux, MP Lighting and Axis Lighting

Toto dual-flush toilets

Moen low-flow faucets and showers

All installations meeting or exceeding New York State energy codes and standards

Solera Super Insulated R-20 windows

ICI low-VOC paints

Whirlpool Energy Star appliances

Bosch Energy Star washers and dryers

Tectonic architectural concrete

Custom metal rails and metal work by KNS Building Restoration Inc.

Shaw carpet with recycled content

Data: Triggers and Obstacles for Green Residential Projects

NEW AND REMODELED GREEN HOMES: TRANSFORMING THE RESIDENTIAL MARKETPLACE DATA

Why Customers Request Green Homes

Approximately two-thirds of home builders and remodelers believe their clients request green homes in order to reduce energy use and save money. All other factors are reported by around one-quarter of the respondents, including concerns about health, comfort, the environment and the level of their investment.

Although the differences are slight, more remodelers report these reasons than builders across nearly every category. However, this result carries more weight when the relatively lower level of green activity among remodelers is taken into account (see page 12). This supports the conclusion that remodeling projects are more likely to be green due to direct client input.

Variation by Level of Green Involvement

BUILDERS

A higher percentage of firms doing largely green work (more than 60%) report customers seeking green for reasons beyond lowering energy use compared to firms with little green work (15% or less):

- Save money—74% compared to 54%
- Better health—37% compared to 24%
- Better comfort—30% compared to 18%
- Better investment decision—29% compared to 16%

This demonstrates that greener builders recognize that there is actually a wider range of motives driving home buyers toward green than might be broadly considered. These more experienced builders may be able to have a more in-depth conversation—or present a stronger marketing campaign—about the holistic benefits of green, especially as their experience may provide them with case study examples of the benefits. This finding also reveals that, while cost savings are clearly important to customers, health and comfort considerations can also be used to differentiate green homes in the marketplace.

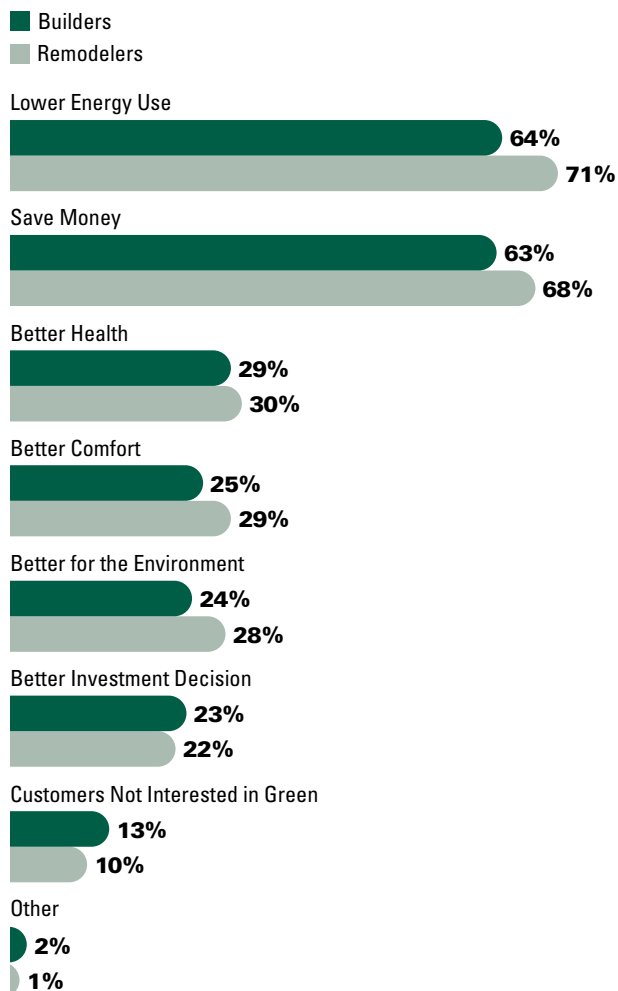
41% of dedicated green builders (more than 90%) report their customers want green homes because they are better for the environment, far more than the average.

REMODELERS

45% of remodelers whose work is more than 15% green report that comfort is a reason their customers seek green retrofits, more than twice as many as those who do fewer green projects (21%).

Reasons Why Customers Request Green Homes or Remodels

Source: McGraw-Hill Construction, 2012



Variation by Region

BUILDERS

38% of firms who build in the Northeast find customers seeking green homes because they are better for the environment, more than the West (28%), the Midwest (27%) and especially the South (17%).

Conversely, builders in the South (68%) report more interest in utility savings than in the Northeast (50%).

REMODELERS

Almost twice as many remodelers in the West (50%) have customer requesting green homes for better health than in the other regions.

Triggers for Green Building Activity

Over 50% of respondents report that nine different triggers have a high impact on their firm's decision to build green homes or undertake green remodeling projects in the future. In fact, only six percentage points separate the top five triggers for builders, and only five percentage points for remodelers. This high response level for multiple triggers suggests that the markets for green homes and remodeling projects are not dependent on any one factor for growth and can be influenced in multiple ways.

Top Triggers for Builders and Remodelers

■ Higher Quality

This factor ties with energy cost increases as the top factor for builders (72%), and it is the second most important factor for remodelers (67%). The importance of quality confirms the findings of the 2006 and 2008 studies, which both found the association of green with quality to be a critical driver for green homes.

■ Customer Demand

The top factor for remodelers (70%), customer demand is also considered important by two-thirds of builders (66%). As mentioned previously, typically customers actively drive the scope of remodeling projects, far more than they do with homes built by a production builder, which accounts for the major role this factor plays with remodeling firms.

However, customer demand also continues to be ranked in the top five factors for builders, as it was in 2006 and 2008. Influencing the priorities of home buyers is still a powerful way to drive the market for green builders.

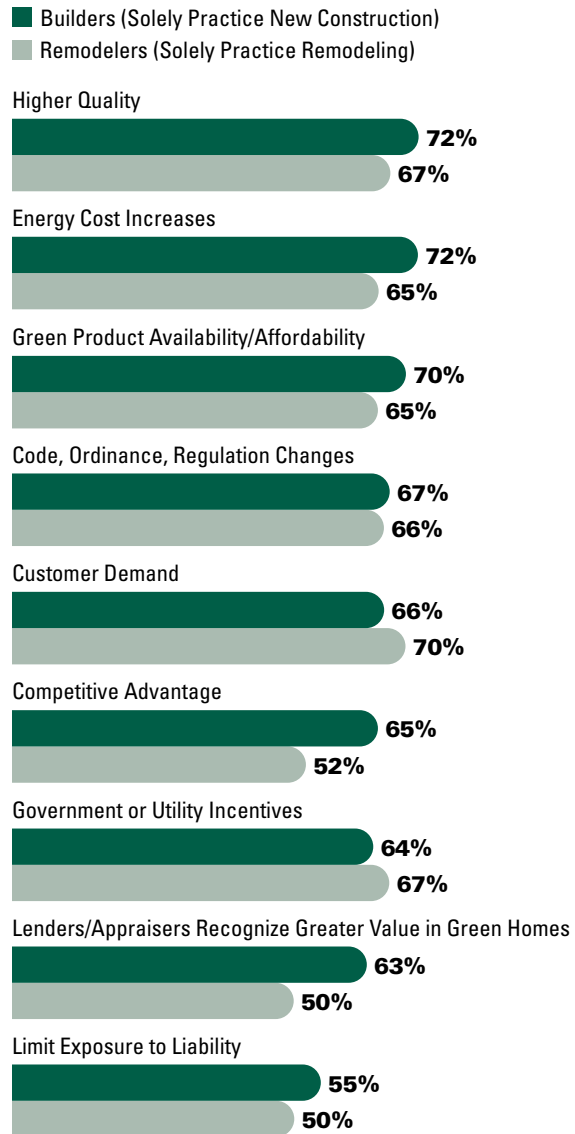
■ Energy Cost Increases / Government and Utility Incentives

In the 2006 and 2008 builder studies, energy cost increases were combined with utility incentives as a category, and in both surveys, that combined category was selected by the largest percentage of builders. However, the current data demonstrate that for new home builders, energy cost increases are more important than utility incentives, with 72% regarding energy costs as important compared to 64% who are motivated by utility incentives.

However, for remodelers, energy cost increases and utility incentives are ranked more closely, with incentives actually considered more important—67% for incentives versus 65% for energy cost increases. The difference between builders and remodelers on this issue is likely

Triggers for Green Building/Remodeling

Source: McGraw-Hill Construction, 2012



due to the ability of incentives to drive remodeling projects. Tax rebates and other incentives may create new work for remodelers, but they make less of a difference in the cost of a new home—to the builder and the buyer.

Triggers and Obstacles for Green Residential Projects

Triggers for Green Building Activity CONTINUED

NEW AND REMODELED GREEN HOMES: TRANSFORMING THE RESIDENTIAL MARKETPLACE DATA

Variation by Type of Firm

Two of the top triggers are more influential with builders than they are with remodelers.

■ Competitive Advantage

More builders (65%) consider competitive advantage an important trigger compared to remodelers (52%). This may be influenced by a variety of factors. Remodeling firms tend to be smaller than many new builders, and that is certainly true of the survey participants. Larger firms may be able to capitalize better on their green investments with more robust marketing capabilities.

Also, the project-by-project approach to remodeling may make marketing their green capabilities more challenging for remodelers than builders of green homes.

■ Lenders/Appraisers Recognize Greater Value in Green Homes

It is not surprising that the home appraisal and financing market has a bigger impact on new homes than remodeling projects, as is indicated by 63% of builders compared to 50% of remodelers finding this issue important.

However, the fact that 50% of remodelers find this factor important is noteworthy. It suggests that, should lenders and appraisers find greater value in green homes, improved financing terms for green remodeling jobs and increased green home value could become greater factors in creating new opportunities for green remodeling projects.

Variation by Size of Firm

SMALL BUILDERS (4 HOMES OR LESS PER YEAR)

For small, custom builders, producing better quality homes is their top trigger at 70%. They are also far more influenced than larger builders by government and utility incentives, probably due to their ability to encourage individual clients to invest in green based on the savings involved.

Other factors that they find more influential than large builders include:

■ Lower Lifecycle Costs (51% versus 30% for large builders)

Home energy use is strongly influenced by the occupants of the house, so it may be difficult for a production builder to market homes effectively based on likely lifecycle costs. However, a custom builder may be able to make a more specific case on a product-by-product basis because of the individual input of its clients. Additionally, closer customer-builder relationships help the builder identify homeowner practices that are contributing the most waste.

■ Opportunity to Protect the Environment (47% versus 28% for large builders)

Like remodelers, custom home builders are more likely to be influenced by specific customer concerns and values. For their greener consumers, the opportunity to protect the environment may make a compelling case that a large production builder is less able to capitalize on.

Top Triggers to Increased Green Building Activity (by Size of Builder)

Source: McGraw-Hill Construction, 2012

Small (1 to 4 Units per Year)		Large (More than 24 Units per Year)	
Higher Quality	71%	Energy Cost Increases	75%
Energy Cost Increases	70%	Competitive Advantage	72%
Code, Ordinance, Regulation Changes	67%	Green Product Availability/Affordability	70%
Green Product Availability/Affordability	66%	Higher Quality	68%
Government or Utility Incentives	65%	Code, Ordinance, Regulation Changes	68%

Triggers and Obstacles for Green Residential Projects

Triggers for Green Building Activity CONTINUED

NEW AND REMODELED GREEN HOMES: TRANSFORMING THE RESIDENTIAL MARKETPLACE DATA

LARGE BUILDERS (MORE THAN 25 HOMES PER YEAR)

While higher quality is an important factor for large builders, several issues rank even higher. Concerns about cost, both for themselves and their customers, appear to be one critical factor, evident by the number who find energy cost increases and the affordability/availability of green products to be important triggers.

However, **the most interesting differential between large builders and small is the importance of competitive advantage, which ranks second for large builders, with 72% considering it important**, compared to only 58% of small builders. Clearly, a strong motivator in a bad market is the marketing advantage provided by green homes for large builders. However, if higher-end homes follow the example of Class A office buildings, as more builders emphasize green, it may become a necessity to compete rather than a differentiating factor.

Variation by Level of Green Involvement

BUILDERS

Builders with a low level of green involvement (less than 15% of their projects) find the greatest motivations to build green are mandates and cost savings. On the other hand, builders with a high level of green involvement (more than 60% of their projects) find the greatest motivation from the quality associated with green homes and the newer green products emerging in the market, as well as the competitive advantage these homes provide. This again demonstrates that firms with experience in green understand the advantages green homes offer beyond mere cost savings.

71% of dedicated green builders (more than 90% of their projects) also consider more green professional education to be an important trigger for building green. This finding suggests that highly green firms may be finding it challenging to find employees with the essential green skills needed to take their projects to the next level of sustainability.

Variation by Region

In general, most of the triggers do not vary widely by region. The few issues that seem to resonate more in some regions than others include the availability and affordability of new products, lenders and appraisers recognizing greater value in green homes, and the exposure to liability.

- **73% of builders in the West are influenced by the availability and affordability of new products, compared to only 61% in the Midwest.**
- **Lenders and appraisers recognizing greater value in green homes is cited as important by a higher percentage of firms in South (61%) and West (65%) than in the Northeast (46%) or the Midwest (57%).**
- **A smaller percentage of firms in the Northeast (38%) are driven by limiting their exposure to liability, compared to 54% in the South and over 60% in the Midwest and West.**

Top Triggers Based on Percentage of Green Buildings in Portfolio (Builders)

Source: McGraw-Hill Construction, 2012

Low (0% to 15%)		High (61%+)	
Codes, Ordinance, Regulation Changes	72%	Producing Higher Quality Products	90%
Green Product Availability/Affordability	66%	Energy Cost Increases	80%
Energy Cost Increases	65%	Product/Building Science Innovation (tie)	74%
		Competitive Advantage (tie)	74%

Obstacles to Increased Green Building Activity

Market conditions are the main obstacles to green building activity—the largest percentage of builders and remodelers are concerned about consumers not being willing to pay the additional cost for green and the impact of current economic conditions.

■ Consumers Unwilling to Pay Additional Cost

This was selected by the highest percentage of builders (80%) and the second-highest percentage of remodelers (70%). The gap between builders and remodelers is also apparent in their estimates of how much it costs to build green versus the amount consumers are willing to pay (see pages 18 and 19 for more information).

The downward pricing trend evident in the market over the last few years—due to high levels of fore-closed homes and high inventories of existing homes for sale—creates a buyer’s market, reinforcing consumer resistance to paying more for green. However, at the same time, the increase in green home activity suggests that some home buyers still want green in their homes in spite of the cost.

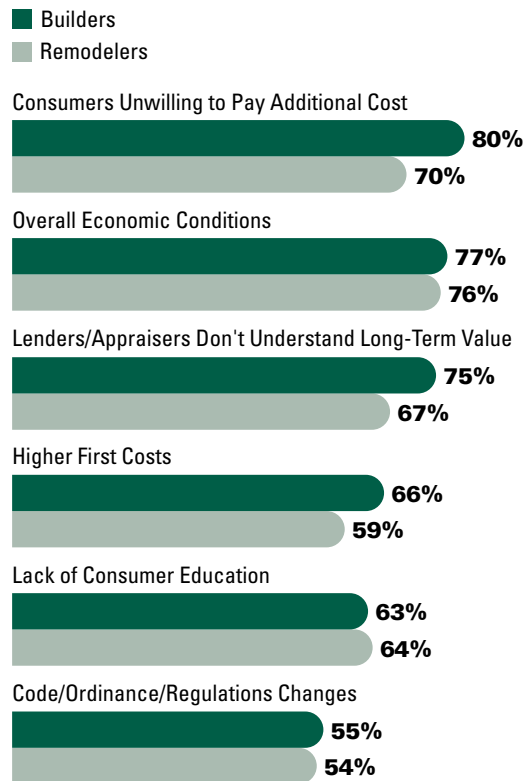
■ Impact of Current Economic Conditions

This was selected by the second-highest percentage of builders (77%) and by the highest percentage of remodelers (76%). While builders perceive greater consumer resistance to paying for green, the negative impact of current economic conditions affects builders and remodelers equally. Obtaining financing for both home purchases and remodeling projects has become more difficult.

The fact that these two obstacles as the most serious may have more positive implications when the residential market improves. The greater emphasis on green since the housing crash has kept green homes relatively stable in the market (see page 8), and as these negative pressures lift, the potential for growth in green home building and remodeling projects should increase.

Top Obstacles to Green Building/Remodeling

Source: McGraw-Hill Construction, 2012



Top Obstacles Based on Percentage of Green Buildings in Portfolio (Builders)

Source: McGraw-Hill Construction, 2012

Low (0% to 15%)		High (61%+)	
Consumers Unwilling to Pay Additional Cost	85%	Lenders/Appraisers Don't Understand Long-Term Value	76%
Overall Economic Conditions	81%	Overall Economic Conditions	66%
Higher First Costs	75%	Consumers Unwilling to Pay Additional Cost	66%

Variation by Level of Green Involvement

There are several obstacles of less concern to green builders and remodelers that are highly involved with green (more than 60% of their work) compared to builders at low levels of green involvement (15% or less).

BUILDERS

- Higher First Costs—43% for those with high green involvement versus 75% for low
- Consumers Unwilling to Pay Additional Cost—66% for those with high green involvement versus 85% for low
- Green Building Takes More Time—a mere 8% for those with high green involvement versus 42% for low
- Concerns Over Liability—20% for those with high green involvement versus 40% for low

Greater experience with green building may account for some of these differences, especially higher first costs, fears about green building taking more time and concerns over liability.

The dedicated green builders (90% green or more) share the same ranking for their top obstacles as those with a high involvement in green (indicated in the table above). However, far fewer of the dedicated green builders actually select the obstacles:

- Lenders/Appraisers Don't Understand Long-Term Value: 73%

- Overall Economic Conditions: 57%

- Consumers Unwilling to Pay Additional Cost: 55%

This is further evidence that experience with green leads to a lower concern about obstacles in general.

REMODELERS

While there were not a sufficient number of remodelers with high green involvement to yield statistically significant differences, the pattern that emerges follows that of builders, with far fewer of those having greater experience in green reporting factors such as higher costs, consumer unwillingness to pay and concerns over liability as having a notable impact on their decision to build green.

Variation by Size of Firm

The largest percentage (83%) of small builders (less than 5 homes per year) are concerned about current economic conditions. However, that issue ranks fourth with large home builders, with 72% reporting it as an important challenge.

Remodelers follow a similar pattern—85% of small remodeling firms (annual revenue less than \$500,000) are concerned about economic conditions, compared to only 67% of large remodeling firms (annual revenue of \$1 million and over).

Top Obstacles to Increased Green Building Activity (by Size of Builder)

Source: McGraw-Hill Construction, 2012

Small (1 to 4 Units per Year)		Large (More than 24 Units per Year)	
Overall Economic Conditions	83%	Consumers Unwilling to Pay Additional Cost	81%
Consumers Unwilling to Pay Additional Cost	80%	Lenders/Appraisers Don't Understand Long-Term Value	81%
Lenders/Appraisers Don't Understand Long-Term Value	77%	Higher First Costs	77%
Higher First Costs	65%	Overall Economic Conditions	72%
Lack of Consumer Education	61%	Lack of Consumer Education	64%

Small firms may be more vulnerable to economic conditions compared to larger ones, which could account for the higher level of concern over this issue by both small builders and small remodelers.

Variation Over Time (Builders With Annual Revenue of \$1 Million and Over Only)

Fewer builders in 2011 with annual revenue of \$1 million and over find the obstacles that were also measured in the 2008 survey to have a significant impact on the green homes market. While these declines were notable throughout, the decreased importance of a few obstacles was particularly striking:

■ Higher First Costs

In 2008, this factor tied for first among the obstacles to green home building. In this 2011 survey, it ranks third among the builders with annual revenue of \$1 million and over—with a 15% decline in respondents who consider it an important issue.

This finding corresponds with the decline in the perceived additional cost of building green from 2008 to 2011 (see page 18 for more information). Greater availability of green products combined with longer experience with green building may contribute to its declined importance as an obstacle.

■ Concerns About Green Product Availability

The dramatic decline in the number of firms who experience this as a serious problem supports the conclusion that the greater availability of green products today has helped drive down concerns over higher first costs.

■ Code/Ordinance/Regulation Changes

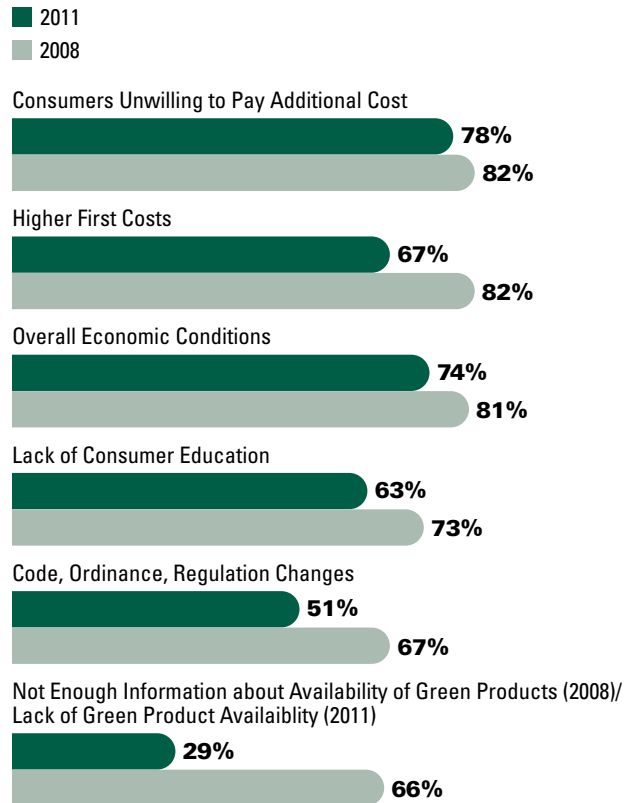
The number of firms who find this a serious obstacle declined from just over two thirds to just over one half. Again, greater experience with green building has likely led firms to become more familiar with code, ordinance and regulation changes and their impacts.

Variation by Region

Fewer firms in the Midwest (23%) consider lack of green product availability to be an obstacle compared to firms in the West (36%) and South (34%). In addition, there is greater concern in the South about lenders and appraisers not fully valuing green (77%) compared to the Northeast (64%) and Midwest (67%).

Top Obstacles to Green by Year for New Home Builders (Annual Revenue \$1M +)

Source: McGraw-Hill Construction, 2012



Green Appraisals: Capturing the Value of Green Homes

Very few home appraisals take into account the benefits of green features, but recent developments could help appraisers add such elements to the equation. However, more needs to be done to quantitatively capture the value that green brings for green appraisals to be more widely used.

In September, the Appraisal Institute introduced the Green Energy Efficient Addendum to Fannie Mae's Uniform Residential Appraisal Report (Form 1004), which is commonly used in the real estate industry for home appraisal reporting.

The new addendum is designed to help appraisers better identify green features in a home, says Sandra Adomatis of Adomatis Appraisal Service in Punta Gorda, FL, who helped develop the addendum.

"[Before the addendum], Form 1004 only offered a simple row labeled 'Energy Efficient Items,'" she recalls. "It required a lot of narrative to properly describe a green property. Most residential appraisers are under time constraints with lenders. We have to turn around reports in 24 to 48 hours. That's almost impossible with a green property when you add the burden of describing the features in a narrative. It adds a lot time."

The addendum offers a checklist approach to help identify green features more easily. Sections of the addendum allow for description of the site, lists of any green certifications, available incentives and detailed description of solar panels.

Adomatis hopes the new form will encourage more appraisers to recognize green features. To date, green building has gained limited traction in the appraisal community. Within the Appraisal Institute (AI), only 2.9% of its roughly 80,000

members have taken any of AI's green training courses. Within the realtor community, the adoption rate is similar. Approximately 2% of National Association of Realtors members have taken its green courses, Adomatis says.

Measuring Green Value

Alan Simmons, who develops courses on green appraisal for AI, says that getting appraisers to recognize the value of green features is only one piece of the puzzle. "A lot of appraisers know that if [a green feature] is more efficient, it will have more value, but there have been so few sales that it's hard to document it," he says. "If you can't document it, then the lenders and underwriters will knock it down because they don't have the proper support. It's a vicious circle."

Simmons adds that more multiple listing services (MLS), which are used to disseminate sales information in the real estate industry, need to include fields where green features can be included in listings.

Adomatis says that, while the housing bust put a damper on the momentum of green home building, a greater focus on green retrofits of existing homes could boost efforts to expand appraisal of green features. "With a retrofit, there is a history of things like utility costs," she says. "If there is a pattern of savings, it's measurable. That's money in the owner's pocket that we can convert to value in the home."

Future of Green Appraisals

Adomatis also notes that political efforts could boost the addendum's use in the future. In October 2011, the Sensible Accounting to Value Energy (SAVE) Act was introduced in the Senate. The bill aims to include energy costs in the underwriting process used by Federal mortgage agencies. That bill, co-sponsored by Mark Begich [D-AK] and John Isakson [R-GA] was referred to the Committee on Banking, Housing and Urban Affairs, but had not seen further action as of late January 2012.

Simmons expects the trend will develop in regional pockets around the country, particularly in areas where more energy-efficient homes are built. A study by the North Carolina Energy Efficiency Alliance concluded in December 2011 found that Energy Star homes in the state sell faster and at a higher price per square foot compared to conventional homes. The study was based on data for new homes built in 2010 in the Raleigh-Durham area. Simmons says similar studies are in the works in other areas, including Fort Collins, CO."

Builders also have a role to play by demanding that appraisers educated in green conduct the assessments of their green homes.

"It's been like an elephant to get moving, but this movement won't go away," Simmons says. "It's inevitable that this will be part of the appraisal process." ■

Interview: Thought Leader

NEW AND REMODELED GREEN HOMES: TRANSFORMING THE RESIDENTIAL MARKETPLACE



Matt Belcher

An experienced builder/developer and nationally-recognized consultant, educator and author, Matt Belcher currently serves as chairman of the National Association of Home Builders Green Building Subcommittee and project director/manager of the U.S. Active House Prototype Project.

How has green evolved in your work over the years?

BELCHER: I can build a better home now than I could five or six years ago, and definitely 10 or 15 years ago, just by the virtue of the fact that the materials that I can build it with are so much better. That is because of the research and development that's been driven by the green market.

What do you think the growth of green building market over the last five years tells us?

BELCHER: I think the strongest message is that green has grown because of the market, without regulation. Green [home building] is now very cost-competitive, and it offers a better product to the market.

How have buyers changed? Are they asking for different things?

BELCHER: Information about green is everywhere—every commercial talks about green, whether it's true or not. So, the buzzwords are out there. [Buyers] know enough to be curious about it, and that's an opportunity for us.

Today, buyers care more about the performance of their homes. The building envelope is more important to them now.

What impact do you think the recession had on green homes?

BELCHER: There were fewer buyers on the market, and the ones that were out there were more discriminating, frankly, because they could be.

“[Building green] isn't necessarily about saving the planet. We always tell our clients we throw that part in for free.”

Once they understand that they can afford a home that's built [green], and once they realize their monthly costs will be lower, then the decision is easy for them. [Building green] isn't necessarily about saving the planet. We always tell our clients we throw that part in for free.

Where do you think the green home market is going?

BELCHER: Green is working its way into codes. We're starting to see it be established in the building codes now. That will also make it more [mainstream].

What is the most critical challenge to increasing green home building and remodeling?

BELCHER: I think, right now, marketing what we do is critical. And of course, [customer demand]. On the production builder side, if buyers start walking into display homes and asking for it, the market will respond.

Have you seen any differentiation in terms of financing availability for green versus non-green, and do you think green homes getting valued in the market appropriately?

BELCHER: We're fortunate here in our market, the St. Louis area. We do have some lenders that get it. We specify appraisers that are

[knowledgeable about] green to the lender. We have a sort of pre-approved bullpen of appraisers. Then, we know we're going to get a correct valuation.

What would you say to builders in markets that don't have that?

BELCHER: Demand it. The Appraisal Institute has information [on green] for appraisers and lenders.

What do you see as the future for green in terms of technologies and methods?

BELCHER: I look for more panelized, modular construction. I think the quality of the [green home] is definitely going to advance because of it.

Is there anything else you see helping advance the market?

BELCHER: Builders need to be educated. A lot of people have left the industry during the downturn, and if things come back quickly, new people are going to enter the industry. We need to make sure that everybody's educated about how to correctly build homes.

The education is out there. The process is out there. The materials to build a better home are now readily available and competitively priced. So, there's no reason why we can't all be building green. ■

Whole-House Green Retrofit—Partnering to Achieve Green Goals and Affordability

802 East McCarty Street Residence
JEFFERSON CITY, MISSOURI

NEW AND REMODELED GREEN HOMES: TRANSFORMING THE RESIDENTIAL MARKETPLACE

Habitat for Humanity River City and the Home Builders Association of Central Missouri partnered to take a foreclosed home provided by the City of Jefferson, MO, and do a “deep green” rehab. By the time the project started, it had garnered over 15 additional partners, including the University of Missouri—Columbia.

The project was both a cooperative effort and a hands-on learning experience, including student involvement in design, carpenters-in-training from local schools and more than 50 Habitat volunteers. As Matt Belcher, consultant on the project, states “[The volunteers] are now all aspiring green builders.”

Benefits of a Green Affordable Home

According to Belcher, the house residents—a couple who work at Lincoln University and their baby—are reaping the project benefits. Not only are they able to walk to work, but their utility bills are only \$50 per month. ■



Adding spray foam insulation also increased space

Below Replacing the addition and going up provided more floorspace



stats

Project Facts

Age of Home

- Built: 1913
- Retrofit: 2010

Size

- Original: 1,100 sq.ft.
2 bed / 1 bath
- After Renovation: 1,600 sq.ft.
3 bed / 1.5 bath

Construction Cost

\$55/sq.ft.

Type of Project

Whole-Home Retrofit

Certifications

Built to the ICC 700 National Green Building Standard, seeking NAHB Research Center Green Certification and the Energy Star rating

Project Players

Builder

Habitat for Humanity River City

Sustainable Building Consultants

Verdatek Solutions LLC

Other Project Partners

visit: habitatgreenbuild.blogspot.com

Project Goals and Activities

Keep same footprint;

Increase living space by 33%

- Lowered main-floor ceiling to 8'
- Added foam insulation to underside of roof
- Created additional bedroom, half bath and storage in attic

Create central staircase;

Manage moisture

Dug 12' x 12' x 5' crawlspace to basement for central stairwell

Increase daylighting;

Maximize southern exposure

Relocated kitchen and bedroom to rear of the home

Increase energy efficiency and durability; Improve indoor air quality

- Added foam insulation
- Added split HVAC system and brought ducts and system inside
- Added geothermal

Improve site conditions

- Added a retaining wall with debris from next-door property
- Added mature, native plants

Additional Green Products

High-efficiency appliances, toilets and plumbing; recycled glass countertops; low-E glass windows; sustainable home waste management program

Photo Courtesy of Central Missouri Home Builders Association/River City Habitat for Humanity

Data: Green Residential Building Practices and Features

Most Important Green Practices

for New Homes and Remodeling Projects

When asked to select the three most important green practices for new homes or remodeling projects, nearly all the builders (97%) and remodelers (96%) chose energy efficiency. This response is consistent with other green research McGraw-Hill Construction has conducted over the past year. Energy efficiency yields the largest direct cost savings of any green practice, it helps reduce greenhouse gas emissions, and in the U.S., it is seen as one means of achieving energy independence.

Except for site planning, the remaining practices were all considered important by around one-third to one-half of the respondents. This finding suggests that no single practice other than energy efficiency has emerged as dominant for creating a green home.

Variation by Firm Type

A higher percentage of remodelers consider durable materials and construction waste management/reduction important compared to new home builders. Durable materials may hold great appeal for homeowners who want to ensure that the improvements they are making will last. New home buyers, on the other hand, may not be as likely to consider the necessity of replacing elements of their newly constructed home.

Remodeling projects typically cost less than building new homes and frequently involve demolition. These two factors combined make waste disposal a larger share of a remodeling project's budget. Money saved by diverting waste from landfills, or earned through recycling of materials like metals, may have a great impact on the budget of remodelers.

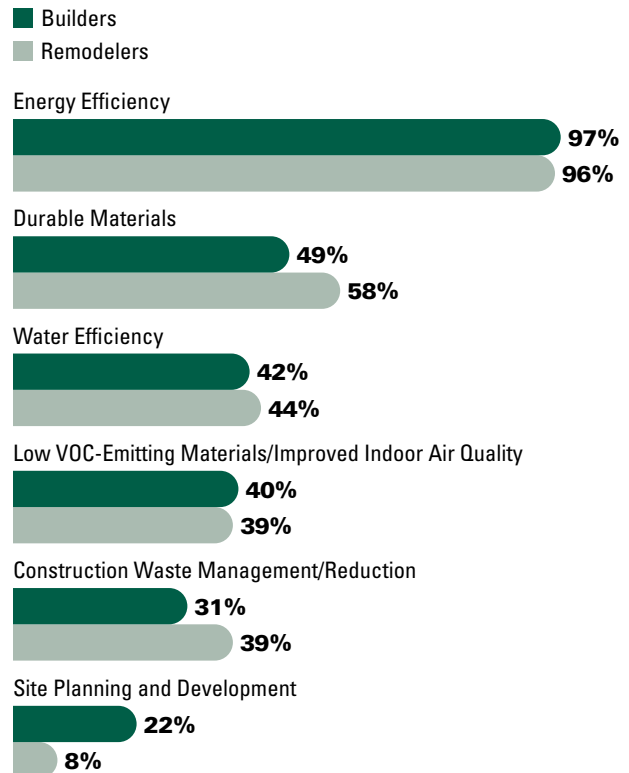
BUILDERS BY FIRM SIZE

More small builders (less than 5 homes per year) find durable materials and water efficiency important than do large builders (25 homes per year or more). Small, custom home builders are typically more engaged with their customers and driven by their interests. Therefore, just like with remodelers, buyers of custom green homes may place more value on issues like durability and water efficiency than the typical buyer of production homes, which have more standardized features. In addition, the emphasis on these factors aligns with the finding that lifecycle costs are more important triggers for small builders than for large ones (see page 26).

A more significant share of large builders report low VOC-emitting materials/improved indoor air quality as important. Large builders may be better able to capitalize

Most Important Green Practices for Green Homes and Remodeling Projects

Source: McGraw-Hill Construction, 2012



on healthier homes in their marketing efforts than small builders. In addition, these materials may be more affordable for larger builders who can buy them in bulk.

BUILDERS BY REGION

55% of firms that work in the South consider water efficiency important, compared to 27% in the Northeast, 29% in the Midwest and 33% in the West. Recent water shortages in major Southern metropolitan areas, such as Atlanta, may have raised the profile of this issue, although lower importance in the West is surprising.

On the other hand, firms in the South are less likely to rate durable materials as important than those in the other three regions.

Site planning and development is selected by a larger share of firms in the Northeast than in the other three regions, where land available for development is more abundant.

Features That Make Homes Greener Than Two Years Ago

Over 80% of builders and remodelers agree that energy efficiency contributes to making homes built now greener than those built two years ago. This result is consistent with the prevalence of energy efficiency compared to other practices. It yields tangible results, including direct energy and cost savings and a reduced carbon footprint. Also, many government and utility incentives have focused on increasing energy efficiency. And new energy-efficient products are introduced to the market on a regular basis.

Variation Over Time (Builders with Annual Revenue of \$1 Million and Over)

Comparison of the current findings for builders with an annual revenue of \$1 million and over to those in the 2008 survey reveals that the industry is increasingly placing greater importance on indoor environmental quality and water conservation. In fact, the shift has been dramatic.

- **Improved Indoor Environmental Quality**
 - 2011: 62%
 - 2008: 39%
- **More Water Conserving Practices**
 - 2011: 41%
 - 2008: 21%

Variation by Level of Green Involvement (Builders)

Across the board, builders who are heavily involved in green (more than 60% of their projects) report that all of these practices make homes greener today, compared to those with a low involvement with green (15% or less of their projects). The most striking differences include:

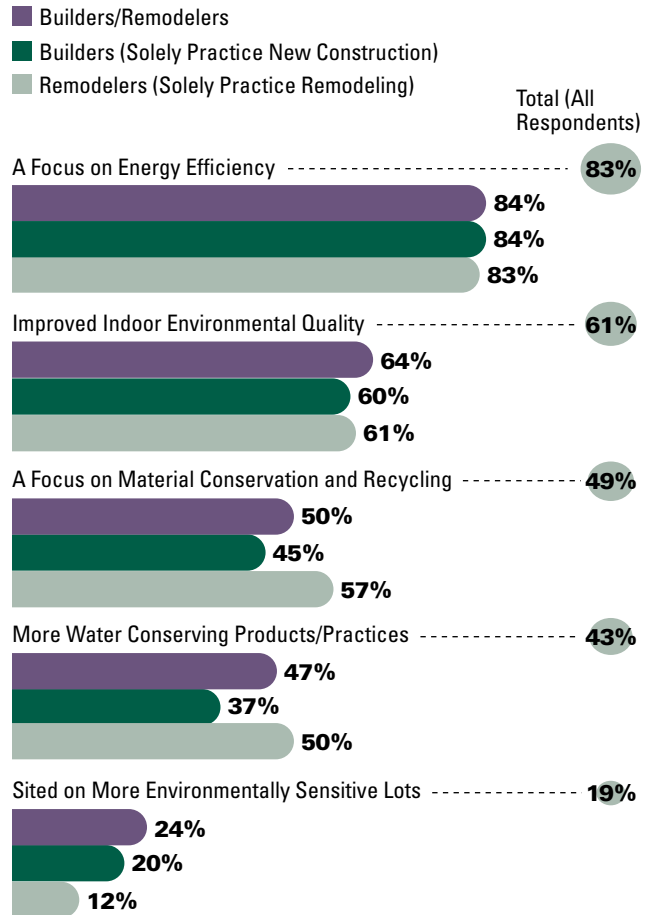
- **Improved Indoor Environmental Quality**
 - High Involvement: 78%
 - Low Involvement: 46%
- **More Water Conserving Products/Practices**
 - High Involvement: 59%
 - Low Involvement: 27%
- **Lot Siting**
 - High Involvement: 38%
 - Low Involvement: 12%

Variation by Region

31% of builders working in the Northeast report that

Features that Contribute to Making Homes Built Today More Green than Two Years Ago

Source: McGraw-Hill Construction, 2012



water conservation makes homes greener today than two years ago, significantly lower than the 40% in the Midwest and 46% in the South and West. This may be due to the relatively lower prices of water and lack of scarcity in the Northeast.

Variation by Firm Size

A significantly higher share of small builders (5 homes or less per year)—22%—believe smaller lot size contributes to making homes greener compared to the share of larger builders believing the same—only 15%. However, it is not clear if this result indicates a lack of importance placed on lot size or a lack of use of smaller lots in current building practices.

Smart Homes: Toward a Next Generation of Green

The increasing demand for energy, rising energy costs and growing environmental concerns are driving interest in increasing electrical efficiency, creating interest in a smart grid, smart metering and smart homes.

A smart grid delivers electricity to consumers using two-way communication technology and a smart metering system. The smart grid combined with smart metering will provide a more efficient grid, reducing losses on the utility side of the meter in generation, transmission and distribution of power.

Smart Meter Growth

Smart metering not only impacts the development of the smart grid, but it also incentivizes better management of electricity consumption in homes. Smart meters can measure the energy consumption of a house or even individual appliances in real time, and they empower consumers to tailor their energy use to times when power is cheapest. As a result, smart meter customers have been able to save 10% on power bills and cut power use by 15%.¹

Smart meters have been experiencing steady growth. Global shipments reached 20.5 million units in 2011 and are expected to rise to 62 million units by 2016.² According to the U.S. Department of Energy (DOE), there are approximately 8 million smart meters in the United States currently, and they expect 40 million meters to be installed by 2015. The DOE states this will result in \$20 billion in direct savings to U.S. customers.³

The growth of smart meters has also been propelled by government initiatives. Stimulus money

from the Smart Grid Investment Grant program has helped drive the replacement of conventional meters with new smart ones.⁴ Use of tax incentives such as the New Energy Efficient Home Credit by home builders and the Energy Efficient Appliance Credit by manufacturers have helped encourage market growth, but since both of these programs expired on December 31, 2011, the future is less certain.

Rise of Smart Homes

Triggered by a growing interest in living more sustainably as well as being fiscally responsible, more home buyers are considering smart homes.

A smart home is a residence that has appliances (heating and cooling, computer, etc.) capable of communicating with one another and can be controlled from any room in the home, as well as remotely from any location by phone or Internet.⁵ While household appliances generally account for up to 90 percent of residential electricity consumption, more of those appliances are becoming "grid-aware," gaining the ability to monitor and report their own usage and to increase or decrease their electricity consumption in response to a remote command.

Grid-aware appliances are able to work with smart meters to avoid peak-hour energy usage and higher pricing. For example, a smart refrigerator tracks the cost of electricity, allowing the refrigerator to defrost when it is cheapest, saving money

while at the same time reducing the power requirements on the grid.

There are also a growing number of home energy management systems (HEMS) products that help households monitor, manage and control energy usage. The global market for HEMS products, currently at \$54 billion, is expected to reach \$85 billion by 2015.⁶

Obstacles

Many in the industry think deploying smart meters is not enough. They argue that smart meters should be paired with services that deliver value to customers, such as HEMS with easy to understand dashboards that will engage the average consumer. Because HEMS are currently only included in a small percentage of homes, further adoption will depend on ease of use and how effectively the systems will analyze data and give consumers specific and actionable information on energy use.

Future Evolution

This industry is poised for growth. Next generation Eco Smart Homes that have smart metering and energy management systems with renewable energy generation capabilities are already emerging and gaining public attention. Households will be able to cut their emissions and further reduce their energy bills by selling excess power back to the grid. And in this economy, lower monthly bills have great appeal. ■

1) U.S. Department of Energy's Pacific Northwest Laboratory, GridWise Project. January 9, 2008. 2) IHS Market Research. "Surging Smart Meter Shipments Spur Soaring Semiconductor Sales." December 2011. 3) U.S. Department of Energy: Energy Efficiency & Renewable Energy. "Modern Smart Grid Offers Consumers Power of Choice." February 7, 2011. 4) SmartGrid.Gov. Smart Grid Investment Program. January 31, 2011 5) SmartHomesUSA.com. "What is a Smart Home?" January 31, 2011. 6) Greentech Advocates. "Home Energy Management An 85 Billion Market." October 20, 2011.

Products and Practices Overview

The next few sections of this study explore the use of specific green products and practices—and the importance assigned to them by the survey respondents. The products and practices are divided into five overarching categories: energy efficiency, materials and resources, water conservation, indoor environmental quality, and lot design and development.

Almost all builders and remodelers use products and practices from all the categories except lot design and development. Such a high level of usage across the categories represents the broad adoption of green practices far beyond simple energy efficiency by the industry. Even though remodelers are not currently as heavily involved in green building as new home builders are (see page 10), their use of products and practices in every category except lot design is slightly higher than home builders. This reveals that their level of involvement with green projects does not fully reflect their overall engagement with green elements, and it supports the conclusion that their green involvement may be influenced by the high degree to which their business is directly driven by their clients—or the single-attribute nature of their work.

Variation by Level of Green Involvement

BUILDERS

The only categories for which there is a statistically significant difference in the builders' level of use are indoor environmental air quality and lot design and development.

■ Indoor Environmental Air Quality

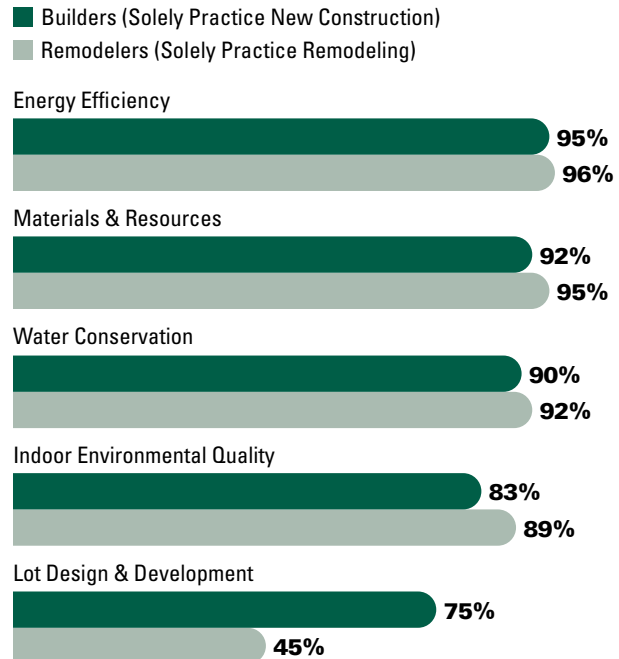
- High Green Involvement (more than 60% of their projects): 95%
- Low Green Involvement (15% or less of their projects): 78%

■ Lot Design and Development

- High Green Involvement: 87%
- Low Green Involvement: 71%

Use of Green Practices and Features by Category

Source: McGraw-Hill Construction, 2012



However, it is important to note that the individual products and practices that fall under the remaining green categories—energy efficiency, materials and resources, and water conservation—have statistically significant differences based on the firms' level of green involvement. This demonstrates that all builders are doing some level of green work, and that greater green involvement is not just evident in the number of green projects but in the number of green products and practices incorporated in those projects.

REMODELERS

Remodelers follow the same general pattern as the builders, with greater variation within the categories and strong differentials at the category level only for indoor environmental air quality and lot design/development.

NEW AND REMODELED GREEN HOMES: TRANSFORMING THE RESIDENTIAL MARKETPLACE DATA

Use of Energy Efficiency

HVAC systems, appliances and insulation are broadly adopted by both builders and remodelers to achieve energy efficiency—with each selected by over 75% of respondents. All of these features experienced increased use during the downturn due in part to federal government homeowner incentive programs. State and utility programs still support the incorporation of many of these practices.

■ HVAC Systems

With 83% of the total respondents investing in properly sized and installed HVAC systems and 81% installing highly efficient HVAC and/or water heating systems, it is clear that HVAC is perceived by the industry to provide a major opportunity for energy savings. Given the fact that space heating and cooling and water heating account for over 50% of total residential energy use,¹ increasing the efficiency of HVAC systems is a critical part of home energy use reduction.

However, highly efficient HVAC systems are installed more frequently by small builders (less than 5 units) than by large builders (25 units or more)—79% compared to 67%. This corresponds to the fact that for small builders, improved lifecycle cost is a more important trigger than it is for larger builders (see page 26). It also suggests that there may be a strong market opportunity with larger builders, especially if this equipment does not add significantly to initial first costs for the house.

The opposite holds true for remodelers—88% of large firms (annual revenue \$1 million or greater) use highly efficient HVAC systems versus 67% of renovators with annual revenues under \$500,000.

■ Appliances

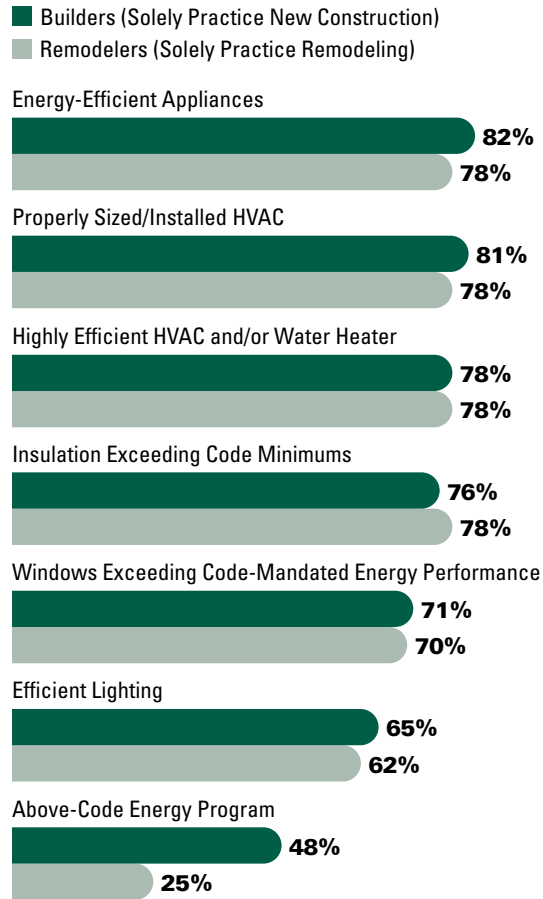
Unlike many building products, energy-efficient appliances have a high level of consumer recognition. Home buyers and owners alike expect to see energy-efficient appliances as a standard part of a green home construction/green renovation project. As might be expected, their adoption rate tops the list.

■ Insulation

Insulation is a relatively inexpensive way to achieve significant improvement in energy performance in both warm and cold climates. Again, its wide use by both builders and remodelers is not surprising.

Top Products and Practices Used: ENERGY EFFICIENCY

Source: McGraw-Hill Construction, 2012



¹U.S. Department of Energy, *Energy Efficiency Trends in Residential and Commercial Buildings*. McGraw-Hill Construction, New York NY, August 2010.16.

Variation by Firm Type

Given the high profile and popularity of energy-efficient measures, it is not surprising that the level of use for these products and practices is relatively consistent between builders and remodelers. In fact, there are only two areas with a significant difference in the degree of use between the two firm types.

■ Above-Code Energy Program

48% of builders report using an above-code program, such as Energy Star, compared to 25% of remodelers. While a label like Energy Star may be important when trying to sell new homes, many people conducting home renovations may be more interested in the energy savings than in paying for certification or a label. This is supported by the difference between small, custom builders, 40% of which use these programs versus 54% of the large, production builders. Smaller builders are more focused on the needs of an individual client while bigger builders are motivated to make their homes more appealing to a general audience, and the use of a program can help communicate goals broadly.

■ Renewable Energy

26% of builders have installed renewable energy systems in their homes, compared to 14% of remodelers. For some types of renewable energy, such as ground source heat, it may be more cost effective to install it into new homes than retrofit it into existing homes.

Variation by Level of Green Involvement

For all 10 energy-efficiency products and practices included in the survey, firms with a high involvement in green (over 60% of their projects) have a statistically significant higher adoption rate compared to firms with low green involvement. Thus, while most firms are including some energy efficiency measures in their projects, the number of elements included by firms with a greater focus on green is much higher. This finding suggests that these firms may not just be building more green projects but the projects themselves may incorporate significantly more green features than those of firms that do less green work overall.

Variation by Size of Firm

BUILDERS

Aside from different levels of use of highly efficient HVAC

systems and above-code energy programs, two other categories show important differences by firm size.

■ Efficient Lighting

72% of large builders report using efficient lighting, compared to 61% of small builders. Firms building large numbers of homes are more likely to standardize their lighting to save money, and selecting energy-efficient lighting allows them to promote their homes as highly energy efficient. Homes by custom builders, on the other hand, may vary the lighting based on the building style and owner's taste, and probably do not have default fixtures they can obtain at highly competitive prices.

■ Passive Solar Design

Small builders, because they are more likely to build custom homes, can more easily adapt home orientation and features to a specific site compared to large-volume builders, which are likely to have standard designs they implement across sites. Therefore, it is not surprising that 34% of small builders use passive solar design techniques while very few large builders (10%) do the same.

REMODELERS

More large remodelers install expensive equipment compared to small remodelers. The higher priced items with a significant differential in use by small and large remodelers include:

- Highly efficient HVAC systems (88% versus 67%)
- Windows (82% versus 65%)
- Renewable energy (27% versus 8%)
- Energy monitoring systems (12% versus 2%)

This suggests that larger firms may have more capacity to include these big-ticket items in their projects. Financing such equipment through the energy savings, if it becomes more widely adopted and simplified, could help make smaller remodelers more capable of taking on these more cost-intensive renovations.

Variation by Region

Firms in the West use passive solar design and renewable energy more frequently than firms in the other three regions. The temperate climate in much of the West may make passive solar design highly desirable to reduce the need to heat and cool homes, and the major Western states all have strong initiatives to encourage the use of renewable energy.

Importance of Energy Efficiency

Just as builders and remodelers use a broad range of energy-efficient products and practices, most consider a large majority of these practices to be important. However, the level of importance reported by those who are using these products and practices and the level of general use do not always align.

■ HVAC

While high-efficiency HVAC units are broadly used, they still rank third in adoption for builders (see page 38). However, 96% of the respondents using them consider high-efficiency HVAC units to be important, and for builders, that figure increases to 97%—the largest share of builders for any energy-efficient product or practice.

With HVAC and water heaters accounting for 50% of the energy use in homes, it is not surprising that builders and remodelers both recognize HVAC's critical importance.

■ Appliances

While efficient appliances are used by the largest share of builders and tied for highest use with HVAC among remodelers, it does not rank as the most important feature for making homes greener. 86% recognize that these appliances are important, but as a category, it ranks fifth. Since appliances only account for 12% of total energy use in homes,¹ they have less impact on increasing efficiency than other elements.

Variation Over Time (Among Builders With Annual Revenue of \$1 Million or More)

Almost all of the energy-efficient measures reported in the 2008 *Green Home Builder SmartMarket Report* that were also included in this survey increased the percentage of builders that consider them important. The only exception is appliances, whose share declined by 5%.

■ Highly Efficient HVAC and/or Water Heaters

- 2011: 97%
- 2008: 94%

■ Above-Code Energy Program

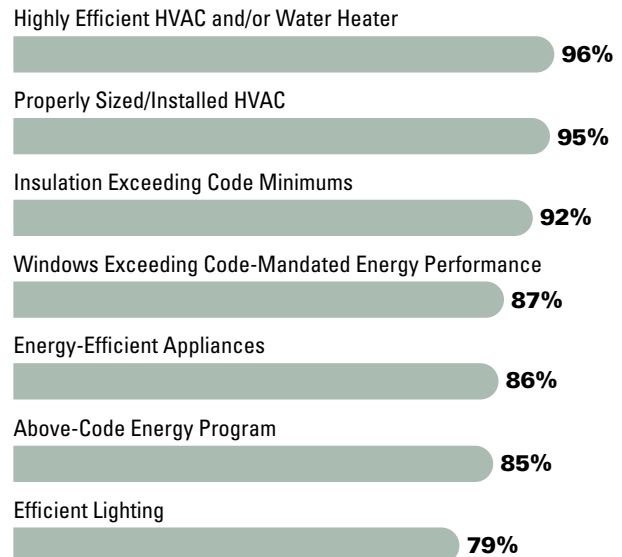
- 2011: 88%
- 2008: 84%

■ Passive Solar Design

- 2011: 69%
- 2008: 62%

Importance of Products and Practices in Achieving Greener Homes: ENERGY EFFICIENCY

Source: McGraw-Hill Construction, 2012



■ Renewable Energy

- 2011: 60%
- 2008: 42%

This suggests that, as builders grow more accustomed to green building over time, their recognition of the value of these practices increases.

Variation by Level of Green Involvement

BUILDERS

Five energy-efficient products and practices are considered important by a larger percentage of builders who are heavily involved in green work (more than 60%) compared to firms that do low levels of green work (15% or less): highly efficient HVAC, insulation exceeding code minimums, windows exceeding code-mandated performance, energy-efficient appliances and energy monitoring systems.

Variation by Region

100% of those who work in the Northeast identify both HVAC categories as important, statistically significantly higher than the other three regions.

¹U.S. Department of Energy. *Energy Efficiency Trends in Residential and Commercial Buildings*. McGraw-Hill Construction, New York NY. August 2010.16.

Use of Materials and Resources Conservation

Although their rankings vary by firm type, the top three products and practices used for resource conservation are the same for builders and remodelers.

■ Prefabricated Components and/or Engineered Wood

Though used by the highest percentage of builders, it ranks a distant third for use among renovators. New construction may offer greater opportunities for prefabricated components, and engineered wood products are frequently structural elements, such as roof trusses, that are likely not included in a typical remodeling project.

■ Construction Waste Reduction

Construction waste reduction and sustainable waste management are used for resource conservation at nearly equivalent levels by builders and renovators.

■ Durable Materials

The largest share of remodelers (71%) report using durable materials. This finding corresponds to the high number of remodelers who selected durable materials as one of the three most important green elements (see page 34). For builders, durable materials rank third, but they are still used by 61%, a substantial percentage.

The heavy use of durable materials may contribute to the association of green homes with higher quality.

Variation by Firm Size

BUILDERS

77% of large builders (25 homes or more annually) report using waste reduction, compared to 62% of small builders (less than 5 homes annually).

Fewer large builders are building smaller homes (39% compared to 47% of small home builders). Larger homes typically yield higher paybacks for developers and may be more standardized by them, while small custom builders may be adapting the home size to the requests of their clients. Home size remains a heavily emphasized feature of a "true green home" by many in the environmental community, and though home sizes have declined during the downturn, it is unclear whether that trend will continue as economic conditions improve.¹

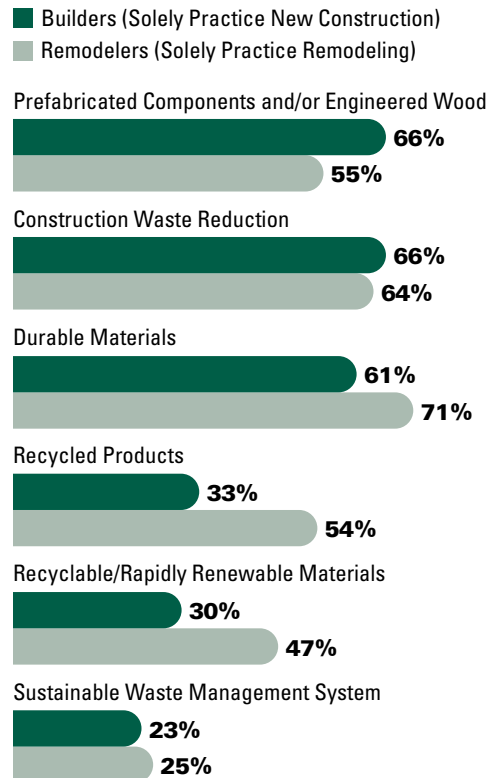
REMODELERS

Large remodelers (annual revenue over \$1 million) use more of the following resource conservation products and practices than small firms (revenue less than \$500K):

- Reduction of Construction Waste: 70% versus 52%
- Recycled Building Products: 70% versus 40%
- Certified Sustainably Harvested Lumber: 42% versus 9%

Top Products and Practices Used: MATERIALS AND RESOURCES

Source: McGraw-Hill Construction, 2012



Variation by Level of Green Involvement (Builders)

A far greater share of builders that are heavily involved in green use nearly all the resource conservation products and practices. The only areas without a statistically significant difference between builders with high and low levels of green involvement are prefabricated components/engineered wood and recycled building products.

Variation by Region

81% of firms working in the Midwest used durable materials, compared to those in the other three regions (between 66% and 69%). Also, a lower percentage of firms working in the Northeast built smaller houses (35%) than firms in the South (49%) and the West (50%). This may be influenced by the large number of retirees who move to the South and West and typically seek smaller homes.

¹Baker, Kermit. "Declines in Home and Lot Size Easing." *AIArchitect*, June 10, 2011. <http://www.aia.org/practicing/aiaab089805>.

Importance of Materials and Resources Conservation

The top four products and practices considered important for resource conservation demonstrate that the industry in general is more focused on waste reduction than in the reducing the use of new materials. In fact, the percentage of builders with an annual revenue over \$1 million who consider recycled products important declined from the 2008 survey—from 63% to 51%.

■ Durable Materials

The highest percentage of both builders and remodelers find durable materials important for achieving greener homes. Notably, far more respondents reported durable materials important than materials made from recycled goods or materials that are recyclable or rapidly renewable. Durable materials extend the useful life of a green home and its systems and reduce the strain on landfills.

The association of green with higher quality—evident in this survey and in the 2008 *Green Home Builders SmartMarket Report*—may account for the high estimation of durable materials. Also, the perception that green homes cost more may be more palatable for customers if they can be assured the materials are more durable. This is particularly true for remodelers.

■ Construction Waste Reduction

For builders and remodelers, more information is typically available about the disposal of waste than the constitution of products. Therefore, respondents may have greater confidence in the impact they can have in reducing waste. This conclusion is supported by the fact that nearly equal percentages of builders, remodelers and those doing both rate this practice as important.

■ Prefabricated Components and/or Engineered Wood

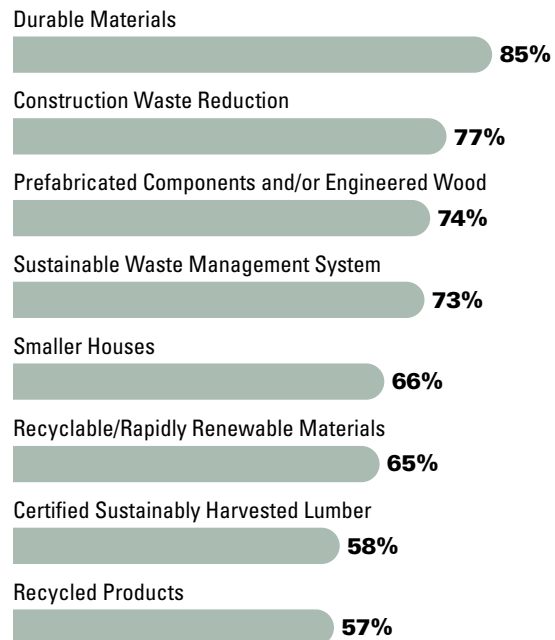
While more builders report using these than remodelers, the remodelers who do use them find them as important as the builders. Prefabrication and engineered wood allow for significant waste reduction because they can be more precisely constructed in an off-site facility. In addition, prefabrication may allow waste products to be reintroduced into the manufacturing stream, further reducing the waste produced by individual components.

■ Sustainable Waste Management System

84% of firms who do both remodeling and new home construction consider this an important factor, compared to 65% of builders and 69% of remodelers. More builder/remodelers consider waste management one of the three most important green practices for their remodeling

Importance of Products and Practices in Achieving Greener Homes: MATERIALS AND RESOURCES

Source: McGraw-Hill Construction, 2012



projects compared to those only doing remodeling work. Since their annual revenues are higher than remodelers, they may have more resources to dedicate to sustainable waste management.

Variation by Level of Green Involvement

A higher, statistically significant percentage of builders and remodelers heavily involved with green (more than 60% of their projects) consider more of the products and practices for resource conservation important compared to firms with low green involvement (15% or less), including durable materials, reduction of construction waste and sustainable waste management systems.

Variation by Region

More firms working in the South (82%) and Midwest (77%) consider sustainable waste management important compared to those in the Northeast (53%) and West (63%). A lower percentage of firms in the South (65%) attach importance to prefabricated components/engineered wood products versus those working in the other regions.

Use of Water Conservation

The water conservation products and practices most commonly used by builders and remodelers are water-conserving fixtures and appliances. Their broad use may be influenced by their wide availability, relatively low-price, ease of installation and competitive pricing.

Variation by Firm Type

Drought-tolerant landscaping is more widely used by builders than remodelers, which is consistent with the fact that many remodeling projects may not involve landscaping at all.

74% of firms that do both building and remodeling employ efficient plumbing techniques in their green homes, compared to 40% of the firms who do only building and 40% of those doing only remodeling. While the builder/remodelers generally indicated a higher level of use for most of the products and practices included in the survey, the difference in this case is striking. The greater variety of these firms' practices may allow them to be more strategic in their approach to designing and installing plumbing systems.

Variation by Firm Size

BUILDERS

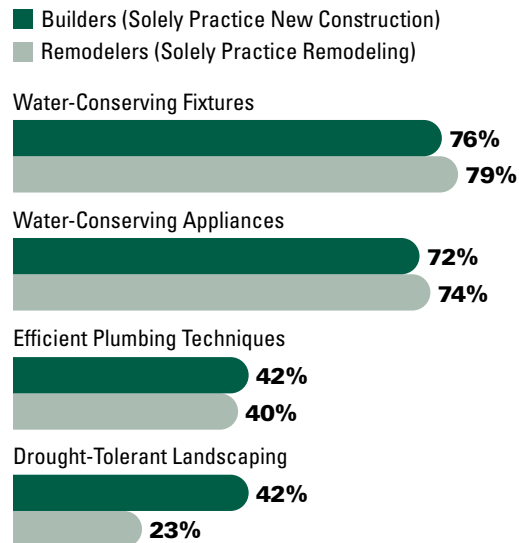
More small builders (less than 5 homes per year) practice drought-resistant landscaping (48%) than large builders who do 25 homes per year or more (33%). This result is surprising since production builders need to landscape across developments, and drought-resistant landscaping is a low-cost practice for the long term. However, production builders are more likely to be guided by general tastes and expectations for homes than custom builders, and elements that use a large amount of water like large stretches of grass and flowering plants may be more appealing to the broader general populace, a critical factor when competing in a difficult market.

REMODELERS

In general, 85% of small remodelers (annual revenue less than \$500,000) use water conservation products and practices, compared to 97% of the large remodelers (annual revenue of \$1 million or more). It is possible that these results indicate that small remodelers find water conservation less important or less economically viable, or it may simply be due to the greater likelihood that larger remodeling projects involve more plumbing and landscaping.

Top Products and Practices Used: WATER CONSERVATION

Source: McGraw-Hill Construction, 2012



Variation by Level of Green Involvement

The trend of significantly higher levels of use by firms with a heavy involvement in green (60% of their projects or more) compared to those with a low involvement (less than 15%) continues with water conservation. For builders, every water conservation product and practice is used by a larger percentage of firms with heavy green involvement compared to those with low green involvement.

- Water-Conserving Plumbing Fixtures: 92% versus 70%
- Water-Conserving Appliances: 86% versus 72%
- Efficient Plumbing Techniques: 57% versus 40%
- Drought-Tolerant Landscaping: 53% versus 38%

Variation by Region

Overall use of these products and practices is evenly spread across the four regions. The only exception is drought-resistant landscaping, which is more widely adopted in the West (51%) and South (45%)—regions with greater concerns about water—than in the Midwest (28%) or the Northeast (15%).

Importance of Water Conservation

The use and importance of water-conserving features generally align, except for drought-resistant landscaping. Nearly two-thirds of those who use this approach describe it as important, despite the fact that it is not widely adopted, suggesting that there is potential for growth in that market.

Variation by Firm Type

64% of builders believe efficient plumbing techniques are important, compared to 45% of remodelers. Remodelers may need to work within the constraints of existing plumbing, while builders may be able to benefit more directly from better plumbing techniques.

Variation by Level of Green Involvement

BUILDERS

The percentage of builders with heavy green involvement (more than 60% of their projects) who consider all four aspects important is much higher than the percentage of builders with a low level of green involvement.

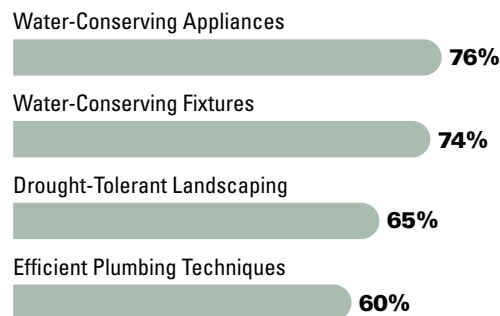
- Water-Conserving Plumbing Fixtures: 83% versus 64%
- Water-Conserving Appliances: 85% versus 70%
- Drought Tolerant Landscaping: 78% versus 59%
- Efficient Plumbing Techniques: 77% versus 55%

REMODELERS

Although the number of remodelers with a high level of green involvement that responded to the survey was too low to draw definitive conclusions, the trend revealed by those that did respond corresponds to the builders' responses for every water conservation product and practice except drought-tolerant landscaping.

Importance of Products and Practices in Achieving Greener Homes: WATER CONSERVATION

Source: McGraw-Hill Construction, 2012



Variation by Region

The percentage of firms that find water-conserving appliances and fixtures important was relatively consistent across all four regions, demonstrating that the issue of water conservation is not restricted to desert or drought areas.

However, for drought-tolerant landscaping, the importance corresponds to the regional patterns of use, with more firms working in the South (73%) and West (67%) finding this an important approach than in the Midwest (48%) or Northeast (38%).

A smaller percentage of firms in the West (47%) consider efficient plumbing techniques important than in the other three regions, where the response rate ranges from 63% to 66%.

Use of Indoor Environmental Air Quality

Increased moisture control and ventilation is used by over three-quarters of the builders and remodelers. With the industry adopting tighter building envelopes to save energy, improved moisture control and ventilation is critical to ensuring those homes maintain healthy indoor air quality. Given the importance and wide use of various energy-efficiency measures, it is not surprising that most firms are also adopting this practice.

Variation by Firm Size

REMODELERS

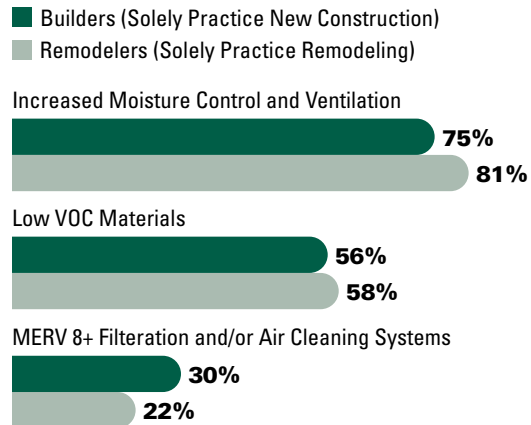
Large remodelers (annual revenue of \$1 million and over) use low VOC materials (70%) and MERV 8+ filtration (30%) more than smaller firms. Like builders, large remodelers may be able to buy low VOC materials in bulk, and they are more likely to do larger, more sophisticated projects than smaller firms, which could explain the wider use of more advanced filtration systems.

Variation by Level of Green Involvement

More firms highly involved with green (60% or more of their projects) are using all of these practices, compared to those with low green involvement (less than 15%).

Top Products and Practices Used: INDOOR ENVIRONMENTAL QUALITY

Source: McGraw-Hill Construction, 2012



Importance of Indoor Environmental Air Quality

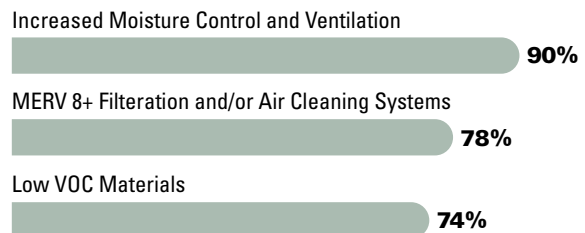
Those who use indoor environmental air quality products and practices rate their importance as quite high, with all products and practices considered important by at least three quarters of the builders and remodelers. This is in direct contrast to the level of use, which is much lower. This result suggests that those with the greatest familiarity with these techniques have a better understanding of their value, and it implies that there is significant potential for growth in this market as more firms become familiar with the benefits they offer.

Variation by Region

98% of firms in the Northeast consider increased moisture control and ventilation important to achieve a greener home, a much larger percentage than in any of the other regions.

Importance of Products and Practices in Achieving Greener Homes: INDOOR ENVIRONMENTAL QUALITY

Source: McGraw-Hill Construction, 2012



MERV 8+ filtration systems are viewed as important by 90% of firms in the Midwest compared to only 62% in the West.

Use of Lot Design and Development

Given that many remodeling projects only involve the home itself, it is not surprising that builders are more likely to use products and practices for lot design and development compared to remodelers. However, even among builders alone, **use of various lot design and development practices is on average lower than the other green home building categories.**

The only practice used by over half of the builders is storm water runoff mitigation. This practice applies to greenfield and brownfield sites alike, which supports a more widespread applicability.

Opportunities for the preservation of wildlife habitats, infill of brownfield or grayfield sites, and proximity to public transportation are limited by the location of the project. The larger percentage of builders seeking to preserve habitats (37%) compared to those that favor infill sites or access to public transportation may reflect a larger trend about the location of housing. Recent policies at both the national and local level, however, seek to encourage firms to create more infill housing to avoid sprawl.

Only 27% of builders report that they are using smaller lots. The notion of increasing density to increase open space is still an emerging trend in the U.S., and it will be important to track its adoption over time.

Variation by Firm Size

BUILDERS

63% of small builders (less than 5 homes per year) practice storm water mitigation, compared to only 51% of large firms (25 homes or more per year). This is surprising given the likelihood that large production builders would have more extensive sites. It suggests that concerns about water conservation on-site are still not a primary driver for these builders.

REMODELERS

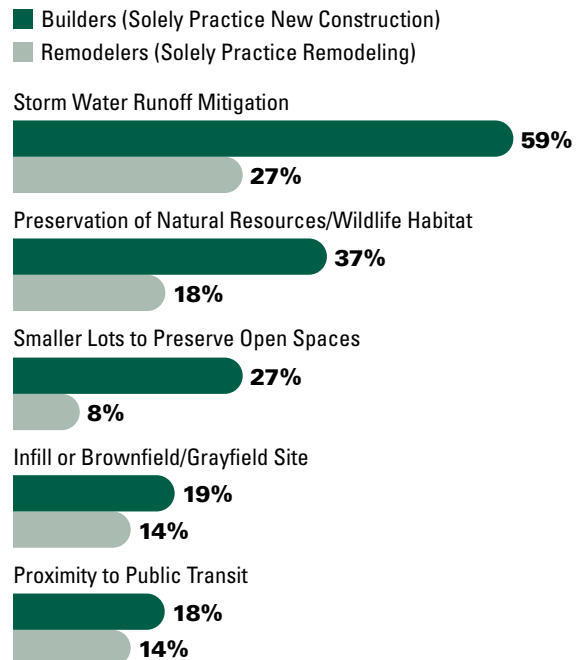
39% of large remodelers (annual revenue of \$1 million or more) practice storm water runoff mitigation, compared to only 17% of small remodelers (annual revenue less than \$500,000). Remodeling projects extensive enough to include significant site work are more likely to be done by larger firms.

Variation by Level of Green Involvement

This category of products and practices continues the general trend that those more heavily involved in

Top Products and Practices Used: LOT DESIGN, PREPARATION AND DEVELOPMENT

Source: McGraw-Hill Construction, 2012



green use them far more frequently than those with low involvement.

BUILDERS

A notably higher percentage of builders that are heavily involved in green (more than 60% of their projects are green) use the following practices compared to those with a low level of green involvement (15% or less):

- Storm Water Runoff Mitigation—71% versus 57%
- Preservation of Natural Resources/Wildlife Habitat—65% versus 34%
- Proximity to Public Transportation—29% versus 16%

REMODELERS

While there are too few remodelers with heavy green involvement to draw definite conclusions, the same trend for builders holds for remodelers. The only exception is that for heavy green remodelers, higher levels of use are evident for each practice listed. In addition, the firms that qualify as moderately green (16% to 60%) also have statistically significant higher levels of use of storm water runoff mitigation, preservation of natural resources/wildlife habitat and use of an infill site compared to those doing a low level of green work (15% or less).

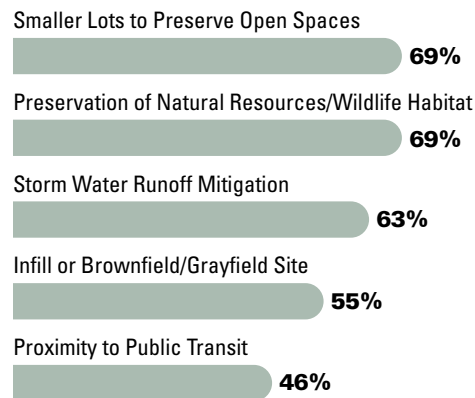
Importance of Lot Design and Development

Among those who use the green lot design and development practices, land preservation is considered most important, with 69% reporting that smaller lots and preservation of natural resources/wildlife habitats are important to achieve a greener home. However, the other land preservation practice, using brownfield or gray-field infill sites, is selected by only 55% as important. This suggests that builders put more emphasis on minimizing impacts when working on greenfield or more natural sites than they do on trying to contain sprawl and limit the use of these sites.

Builder attitudes about lot design and development practices are relatively consistent through most regions, and they show less variation among builders by level of green involvement than the other categories. Only storm water runoff mitigation is considered more important by a significantly higher percentage of those with heavy green involvement (74%) versus those with low green involvement (52%). This differential may be due in part to the emphasis on storm water mitigation in green home rating systems.

Importance of Products and Practices in Achieving Greener Homes: LOT DESIGN, PREPARATION AND DEVELOPMENT

Source: McGraw-Hill Construction, 2012



Data: Green Building Products

Trusted Sources of Information on Green Building Practices and Products

There is a clear preference among builders and remodelers for getting green building and product information from independent organizations/resources or people they trust. This is not surprising considering the vast number of green products and green claims in the market and the real and perceived greenwashing that occurs. Yet, there is still a need for the residential construction industry to be educated on the products, technologies, materials and practices that can make homes more sustainable and higher performing.

Therefore, it is critical that product manufacturers partner with trade associations and education providers and build relationships with builders, so that needed information can get to the market.

Differences exist between different builder and remodeler demographics. These are important to note when making targeted marketing investments.

Builders Compared to Remodelers

- Builders more often trust trade shows and conferences compared to remodelers—60% versus 53%.
- Significantly more remodelers trust print literature—40% compared to 26% of builders.

Variation Over Time (Builders with Annual Revenue of \$1 Million and Over)

Compared to the 2008 study, builders are shifting toward personal contacts or third-party sources for information about green. One notable drop was in the use of print literature. In 2008, 90% of builders reported print literature as a most trusted source of information for green building products. In comparison, this study shows that only 33% of builders and remodelers report print literature as a trusted source of information.

Variation by Firm Size

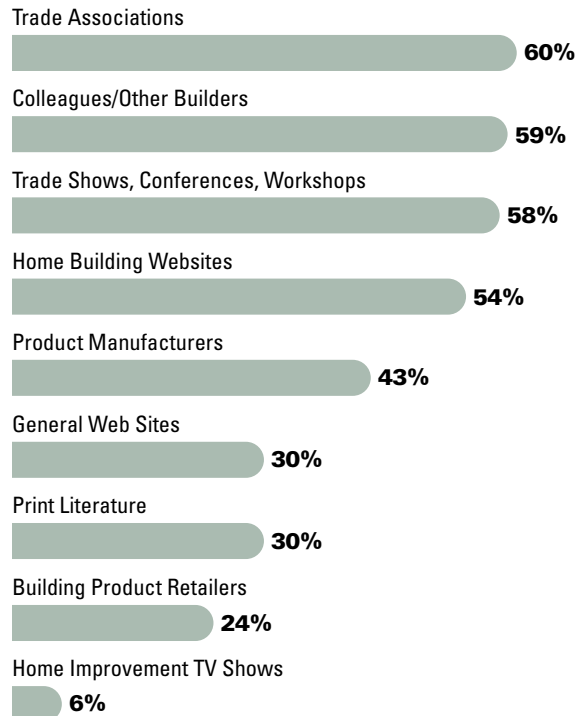
BUILDERS

- Large builders rely on colleagues and peers more than smaller builders—75% compared to 63%.
- Small builders more often rely on trade associations—65% compared to 57% of large builders. They also more heavily use retailers for information.

These differences may stem from larger builders' access to a broad national network of peers, whereas smaller

Most Trusted Sources of Information About Green Building/Products

Source: McGraw-Hill Construction, 2012



builders are more likely to look to local sources, such as retailers, or established networks through associations.

REMODELERS

Large remodelers prefer trade shows and conferences significantly more than small remodelers, who view trade associations and home building websites as their most trusted sources of green information. Larger firms likely have access to resources that involve travel or training, whereas smaller firms rely on more accessible resources.

Variation by Level of Green Activity

78% of builders and 73% of remodelers heavily involved in green (60% of their projects or more) report trade shows, conferences and workshops as their trusted sources of information, compared to 54% of those with low involvement. This suggests that attendees of trade shows are more likely to be knowledgeable about green.

On the other hand, 58% of builders and 66% of remodelers with relatively low green involvement report trade associations as their most trusted source.

Ability to Name a Top-of-Mind Green Product Manufacturer or Brand

Most builders and remodelers can name a company or brand associated with green building for a majority of product categories, with doors and windows being the highest, at 85%. Six other product categories closely follow. This ability by the industry to name a brand—even for those firms not heavily engaged in green—reflects the prevalence of green on many company websites and in marketing materials and product information.

Variation Over Time (Builders With Annual Revenue of \$1 Million and Over)

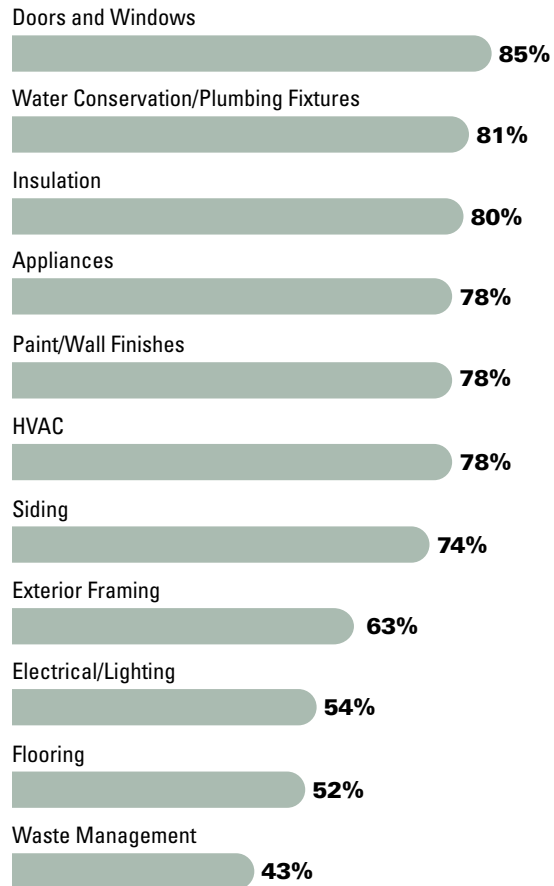
Compared to the findings in the 2008 *Green Home Builders SmartMarket Report*, this 2011 study reveals that builders have increased their level of brand recall across all the listed green building product categories. [Note: Flooring and waste management were not included in the 2008 survey.] The most significant increases include:

- **Doors and Windows—87% of builders in 2011 could name a brand they associate with green, compared to 76% in 2008.**
- **Water Conservation/Plumbing—84% of builders in 2011 could recall a green brand, compared to 72% in 2008.**
- **Paint and Wall Finishes—79% of builders in 2011 could recall a green brand, compared to 63% in 2008.**

These findings suggest several things—that market penetration of green building products has increased, that more products are now available in the market, and that manufacturers are recognizing the value of green to the market and are increasing their communications efforts around the green benefits of their products or services. We expect this trend to continue as the green residential market continues to grow and as consumers and a larger number of builders and remodelers increase their involvement.

Ability to Name a Top-of-Mind Green Company/Brand by Product

Source: McGraw-Hill Construction, 2012



Top-of-Mind Green Brands

As the green building market grows, so does the penetration and proliferation of green building products. More builders and remodelers are able to identify green brands in the market (see page 49). While top-of-mind responses can also reflect the overall brand awareness of those with the largest market share, the sheer increase in the number of brands mentioned more than 5% of the time reveals that more manufacturers are gaining traction in the green marketplace.

Overall, the brands recognized as green in 2006 and 2008 maintained their position in the 2011.

However, several new green brands and products emerged:

- **Doors/Windows:** Therma-Tru
- **Insulation:** Icynene and CertainTeed
- **Water Conservation:** Moen and Toto
- **Appliances:** Bosch and KitchenAid

This year, two new categories were added—flooring and waste management. While several brands emerged as green for flooring, only Waste Management was identified as a green brand in the waste area by more than 5% of respondents.

Top-of-Mind Green Product Brands Reported by More than 5% of Respondents

Source: McGraw-Hill Construction, 2012

Product Category	2006	2008	2011
Doors & Windows	1. Andersen (15%) 2. Pella (11%)	1. Andersen (17%) 2. Pella (12%) 3. Marvin (8%)	1. Andersen (18%) 2. Pella (14%) 3. Marvin (12%) 4. Therma-Tru (6%)
Insulation	1. Owens Corning (29%)	1. Owens Corning (26%)	1. Owens Corning (25%) 2. Icynene (9%) 3. Foam/Spray Foam (7%) 4. CertainTeed (6%)
Water Conservation/ Plumbing	1. Kohler (22%)	1. Kohler (21%) 2. Delta (14%)	1. Kohler (32%) 2. Delta (16%) 3. Moen (14%) 4. Toto (6%)
HVAC	1. Trane (17%) 2. Carrier (12%) 3. Lennox (10%)	1. Trane (17%) 2. Carrier (14%) 3. Lennox (13%)	1. Trane (20%) 2. Carrier (12%) 3. Lennox (8%)
Paint/Wall Finishes	1. Sherwin-Williams (21%)	1. Sherwin-Williams (32%) 2. Benjamin Moore (8%)	1. Sherwin-Williams (39%) 2. Benjamin Moore (12%)
Appliances	N/A	1. GE (34%) 2. Whirlpool (13%)	1. GE (26%) 2. Whirlpool (15%) 3. Bosch (7%) 4. KitchenAid (6%)
Siding	1. James Hardie (11%)	1. James Hardie (19%)	1. James Hardie (38%) 2. CertainTeed (11%)
Exterior Framing	Trex (31%)	Trex (27%)	Trex (24%)
Flooring	N/A	N/A	1. Shaw (9%) 2. Armstrong (7%) 3. Bamboo (6%)
Waste Management	N/A	N/A	Waste Management (13%)

Building Green and Affordable High-Performing Production Homes

Salttillo Community ALBUQUERQUE, NEW MEXICO

NEW AND REMODELED GREEN HOMES: TRANSFORMING THE RESIDENTIAL MARKETPLACE

When Paul Allen tells people that the houses he builds are third-party certified to cost less than a \$100 per year to heat and less than a \$100 per year to cool, they are astounded. But perhaps as astounding to them is the fact that Paul Allen Green Built Homes come at a price range of \$129,000–\$245,000.

Green Involvement

After being a general contractor in Albuquerque for 32 years in commercial construction and large-scale land development, Allen turned to building houses when the big downturn hit. He knew he wanted to build houses that he felt were absent up to that point in the marketplace—high-performing, quality homes at affordable price points.

Green was not part of that initial concept but upon the urging of his two daughters, Allen investigated green home building and the LEED rating system and ICC 700 National Green Building Standard. Going back to the drawing board, he reincorporated green standards into his plans and built his first NAHB Research Center Gold Certified Home in 2009. He has not looked back since.

Despite the economic downturn, Allen reports that the demand for green homes has been strong. “We built 105 Gold Certified Homes in 2010 and out-produced the entire industry in the United States in that year.”

High-Performing and Gold Certified Homes

Allen’s most recent project is

the development of a 650-home community in Salttillo, located in northwest Albuquerque. The location is adjacent to the second-largest “arroyo” or large open-space area in Albuquerque and includes walking and bike trails that connect to all of the bike networks in the city. The trails were designed at considerable expense but have proven to be an amenity that significantly contributes to the attractiveness of this housing community.

To achieve high performance on his Salttillo homes, Allen used techniques such as insulated foundations that create thermal blocks, densely insulated thick walls, and heating and cooling ducts that run underneath the insulation rather than up in the attic. All of Allen’s green homes are NAHB Research Center Gold certified



The typical Paul Allen Green Built Home takes 4-1/2 months to build upon contract signing.

stats

Project Facts and Figures

Builder

Paul Allen Green Built Homes

Type of Project

650-Home Residential Community

Types of Home

Single family, one and two stories

Size

950 sq. ft.–2,214 sq.ft.

Price

\$129,000–\$245,000

Location

Albuquerque, New Mexico

The Certification

NAHB Research Center Gold Certified

Photo courtesy of Paul Allen Green Built Homes

CONTINUED

Salttilo Community ALBUQUERQUE, NEW MEXICO



Paul Allen Green Built Homes feature a large variety of floor plans all of which are semi-customizable, though Allen reports customers tend to prefer the single-story layouts.

and meet Energy Star 3.0 standards. Each home comes with a Home Energy Rating Score showing how much it costs annually to heat and cool the house, heat the water, and run the lighting and appliances. The report and the certification become a part of the deed and the title policy.

Bringing Value to the Market

According to Allen, the green homes his company has built have helped everything around them. "When we first started building, the more standard homes that had been built in the area were having some trouble on resale because of the market," says Allen. As a result, appraisals were down.

However, Allen's green homes were able to get a different set of appraisals because they were built to high-performance green standards. Allen adds, "We've not only influenced the salability of our houses, but we've helped the houses around our area by establishing higher per-square-foot prices."

One of Allen's motivations for keeping his price points low has been his desire to get more penetration into the market. This has likely also been a business imperative since buyers look for affordability as well as green when making purchasing decisions. Allen is fortunate. Since he sells his own homes, he has been able to save on marketing fees, which compensates for the higher costs of materials involved in building green homes.

Another motivation is Allen's desire to give back to his community. Allen says, "Everybody's having a rough patch out there, and there's no reason in the world that the buying public should be denied a high-quality house at an affordable price. You don't always have to work on the same margins."

As a testament to the success of his green work in this economy, Allen points out that he has not laid off a single employee, but has actually hired during this downturn as he continues to grow his business. ■

Green Home Features

Foundation

3 stage poured foundation with 3500 PSI concrete

Thermal block interior 2' under interior stem walls

Thermal block interior 2' under foundation cap perimeter

Double insulated Aquapex water lines above and below grade

Walls

2x8 high stud framing

9 foot sidewalls

R-31 blown fabric bound side-wall insulation

Structural wood exterior sheathing

Double glass low emissivity windows rated at 3.3

Roof

1 Foot extended overhung eaves roof perimeter

5/12 and 6/12 roof pitch

R-60 blown attic insulation

Interior

Energy Star lights and appliances

Energy Star tankless water heaters

Carrier furnaces rated at 95% efficient

Carrier refrigerated air rated at 15 seer

Eco quantum dual flush air pressurized assist toilet

Exterior

Sto-stucco elastomeric fiberglass reinforced exterior

Landscaping

Automatic irrigation designed by LEED accredited landscape architect

Data: Green Ratings

NEW AND REMODELED GREEN HOMES: TRANSFORMING THE RESIDENTIAL MARKETPLACE DATA

Impact of Third-Party Certifications on Green Product Selection

Overall, opinions are divided among builders and remodelers as to whether third-party certification programs have an impact on selection of green products. In fact, an almost equal number of respondents report a medium strong/strong impact (39%) as those that report no/minor impact (36%).

Variation by Builder and Remodeler

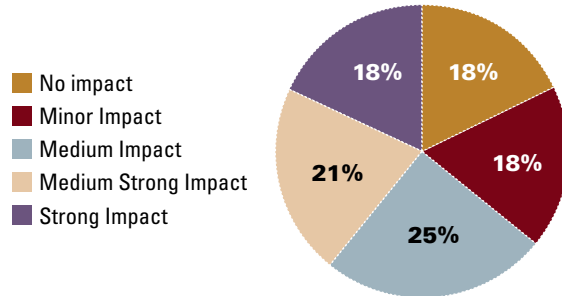
A different picture emerges when comparing builders and remodelers.

- **44% of builders believe third-party certification programs have a medium strong/strong impact on their selection of green products compared to only 30% of remodelers.**
- **Conversely, 47% of remodelers report that third-party certifications have little to no impact compared to 29% of builders.**

This difference could be attributed to the fact that builders and their sales teams must be more attuned to the green home benefits that are most compelling to potential home buyers, and as a result must pay attention to the green products that have third-party green certifications and can help make homes more marketable. If builders can connect the certification or rating to a benefit, such as a healthier place to live, lower operating costs or a sustainable lifestyle, builders and remodelers will be able to get more value from them than single-attribute certifications or labels.

Impact of Third-Party Certification Programs on Green Product Selection

Source: McGraw-Hill Construction, 2012



Variation by Firm Size

Findings show that there are also differences when comparing firm size by revenue.

- **52% of respondents from large firms (revenue of \$5 million or more) report that third-party certification programs impact their selection of green products.**
- **Only 33% from small firms (revenues under \$500,000) report third-party certifications impact their selection.**

This difference suggests larger firms may be looking for labels that they can use in standard marketing materials, which may not be as important to smaller builders who have a different, more interactive relationship with their customers, making the labels less necessary.

These results indicate that building product manufacturers should highlight green product labels and certifications to larger builders, while focusing on other strategies for smaller builders and remodelers in order to convey the green value those products can bring to a project.

Awareness of Green Building Product Ratings

Energy Star is by far the most recognized green product certification/rating program, with 86% of survey participants reporting either being aware or highly aware of the label. No other label has high awareness by more than half the respondents. This suggests that providers of labels, service providers, educators and product manufacturers need to improve education about the value of these different labels—and what they mean to a home.

Remodelers Compared to Builders

Remodelers and builders trend similarly regarding awareness of green product certifications/ratings with only a few exceptions. Builders (17%) recognize GreenGuard relatively more than remodelers (10%), while on the other hand, remodelers are more familiar with Cradle to Cradle (15%) than builders (8%). In general builders that do both new home and remodeling work are more aware of most product labels as compared to their counterparts.

Variation by Level of Green Involvement

Not surprisingly, builders and remodelers that are heavily involved in green (60% of projects or more) are more familiar with green building product labels and certifications.

BUILDERS

Significant differences include:

- 96% of builders highly involved in green are aware or highly aware of Energy Star, compared to 79% with low green involvement (15% of their projects or less).
- 59% of builders heavily involved in green are aware or highly aware of UL Environment, compared to 42% of those with low involvement.

REMODELERS

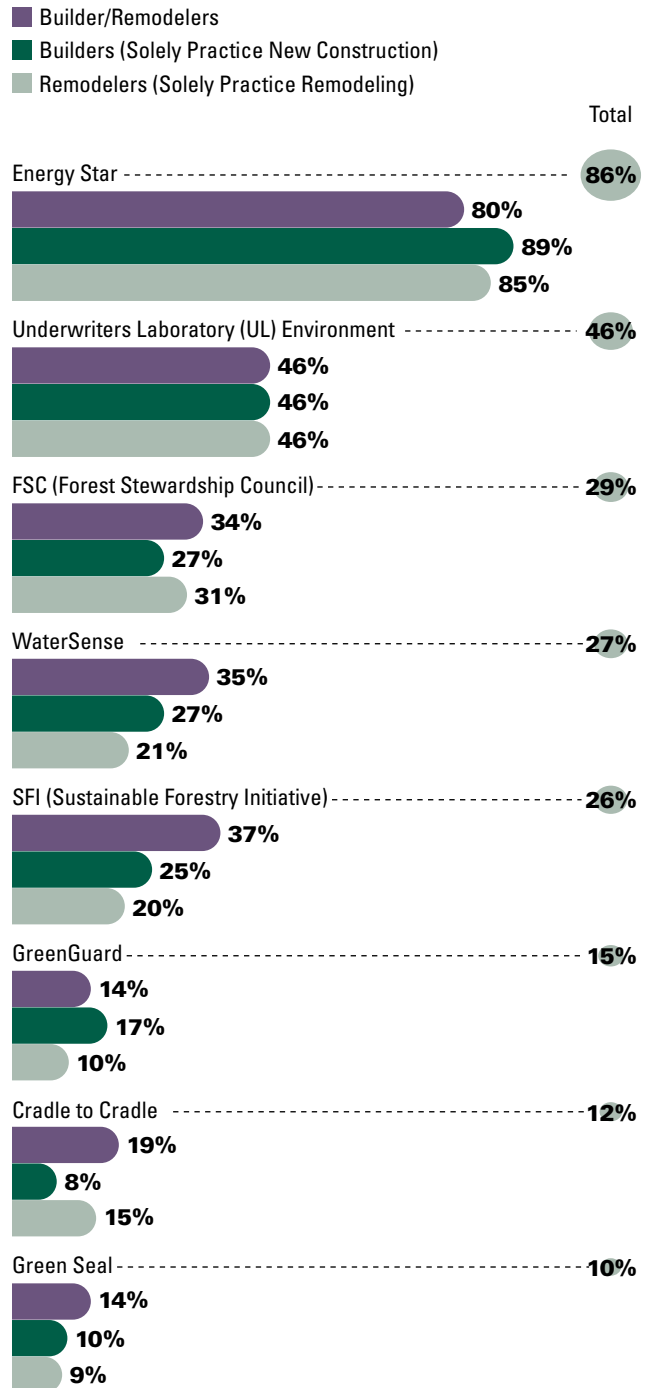
Like their builder counterparts, 96% of remodelers heavily involved in green are aware or highly aware of Energy Star, compared to 77% of those less involved with green.

Variation by Firm Size

While 91% of large builders (25 units or more) are aware or highly aware of Energy Star, compared to 81% of smaller builders (5 units or less), only 19% of large builders are aware or highly aware of FSC, compared to 31% of smaller ones. This finding suggests that experience with labels is not necessarily a function of firm size but of product type.

Firms with High Awareness/Knowledge of Green Product Certification and Rating Programs

Source: McGraw-Hill Construction, 2012



Green Home Building Certification Awareness and Usage

More than 80% of builders and remodelers are aware of LEED for Homes as a green building rating system, and nearly half recognize the ICC 700 National Green Building Standard. While LEED for Homes is more widely recognized, only one in six report using this rating system compared to over a fifth indicating use of the ICC 700 National Green Building Standard.

These two ratings systems have the most penetration in the green residential market. LEED-ND at 22% awareness and 2% usage is a distant third, followed by GreenBuilt, Build-It-Green, regional, state or local programs, EnergyStar and others.

Builders Compared to Remodelers

Green building rating systems awareness is quite similar among builders and remodelers with one exception—25% of builders recognize LEED for Neighborhood Development (LEED-ND) compared to only 14% of remodelers.

There is also one significant difference when it comes to usage—19% of builders use LEED for Homes compared to only 6% of remodelers. It is not surprising that remodelers trend lower given that neither LEED for Homes nor LEED-ND are designed for remodeling projects.

Variation by Firm Size

Small builders are less influenced by the added cost and time of certification, and are less likely to cite this as a burden to certifying projects.

Variation by Level of Green Involvement

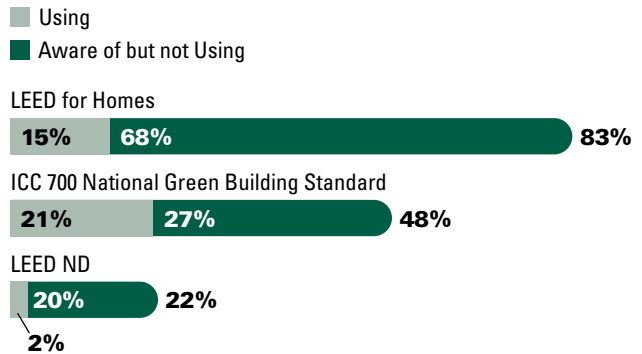
Builders and remodelers heavily involved in green building (60% or more per year) exhibit more awareness and usage of green building rating systems compared to those with less green building involvement (15% or less).

Variation Over Time (Builders With Annual Revenue of \$1 Million and Over)

Awareness of LEED for Homes and the ICC 700 National Green Building Standard among builders increased over the last three years. In 2011, 81% of builders reported awareness of LEED for Homes, compared to 63% in 2008. Similarly, for ICC 700, 55% reported being aware in 2011 versus 44% in 2008. This increase in awareness is yet another indicator of the growth of green in the residential marketplace.

Awareness and Use of Green Building Standards and Certification

Source: McGraw-Hill Construction, 2012



Methodology:

New and Remodeled Green Homes Study Research

NEW AND REMODELED GREEN HOMES: TRANSFORMING THE RESIDENTIAL MARKETPLACE

The research findings in this report are based on an online survey of the U.S. home builder and remodeler community as represented by the National Association of Home Builders (NAHB) membership database. A total of 26,943 e-mail invitations with a link to the online survey were sent by NAHB to their members. Potential participants were incentivized with an opportunity to win one of 50 Home Depot \$50 gift cards.

The survey was conducted from November 11 to December 11, 2011, with a total of 416 responses included in the final analysis. The total sample size used in this survey benchmarks at a 95% confidence interval, with a margin of error of less than 5%.

All subgroups referred to below have ample respondents to offer statistically significant conclusions.

Representation by Firm Type

The chart below indicates the types of firms the research included. For the purposes of data analysis, these were broken into three groups:

- **Firms that solely practice new home building: 224 respondents**
- **Firms that solely practice remodeling: 118 respondents**
- **Firms that practice new home building and remodeling: 74 respondents**

Representation by Size

BUILDERS

The firms also varied in terms of size. For the purpose of analysis, home builders were analyzed by the number of residential units they build per year. The firms include all

those doing new home construction, including those that conduct remodeling projects as well.

- **1–4 residential units: 158 respondents**
- **5–24 residential units: 66 respondents**
- **25 residential units or more: 47 respondents**

REMODELERS

For the purpose of analysis, remodelers were grouped by their annual revenue. This group of respondents represents all firms that engage in remodeling, including those that also do new home building.

- **Revenue less than \$500,000 per year: 67 respondents**
- **Revenue of \$500,000 to under \$1 million: 122 respondents**

- **Revenue of \$1 million or greater: 66 respondents**

Representation by Geography

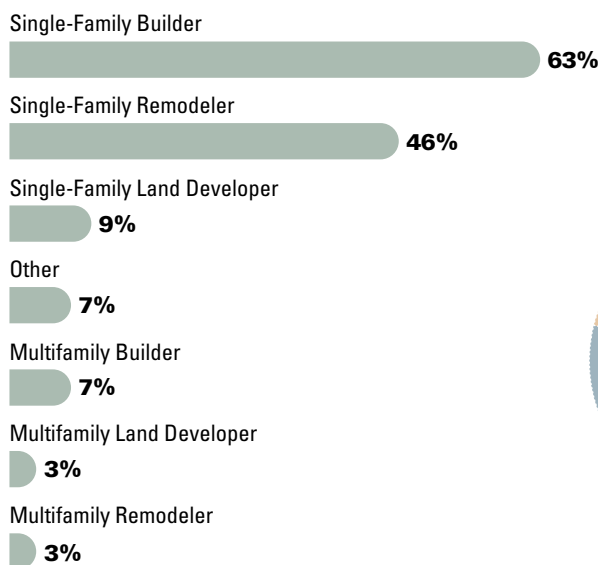
The geographical distribution indicated in the chart below represents the regions in which the respondents build or renovate homes.

Comparisons to Previous Studies

Two previous studies of home builders referenced in this report were conducted by McGraw-Hill Construction and also drawn from the NAHB membership. In 2006, 353 builders completed a survey conducted and analyzed between December 2005 and March 2006. In 2008, 400 builders completed a survey conducted between February 2008 and March 2008. ■

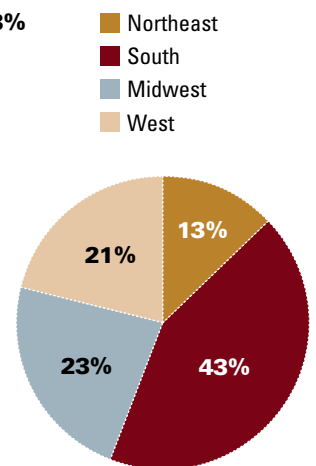
Type of Firms

Source: McGraw-Hill Construction, 2012



Regional Distribution of Respondents

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GreenSource: greensourcemag.com

Research & Analytics:

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Architectural Record: archrecord.com

Engineering News-Record: enr.com

Sweets: sweets.com

SmartMarket Reports:

analyticsstore.construction.com

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A message from ...

Barry Rutenberg

Chairman, National Association of Home Builders (NAHB)

Barry Rutenberg

The NAHB is pleased to have taken part in this new *Smart Market Report*. NAHB builder and remodeler members were surveyed on their green building practices, which allowed us to shine a light on the state of the green market. The results highlight the enormous growth of green building and its impact on the overall housing market. As the green marketplace continues to expand, builders and remodelers are looking for ways to build upon their skills and remain ready to meet the demands of an ever-changing building environment. This report offers key insights into potential market opportunities and trends.

We are proud to have been a partner with McGraw-Hill Construction and Waste Management in keeping at the forefront of this exciting and rapidly changing area.



National Association of Home Builders
www.nahb.org



A message from ...

Jim Halter, LEED® AP + BD&C

*Vice President,
Construction Solutions
Waste Management*

Jim Halter

For those of us in the construction industry, we already have a sense that green building is on the rise. We see it every day as expected diversion rates climb, more emphasis is put on energy efficiency and more products are made from post-consumer materials. The real value of this *SmartMarket Report* is that it puts numbers to what builders are doing and customers are demanding—it illustrates the momentum that's pushing our industry forward.

Waste Management is honored to sponsor this quality research on the transformational changes in the green residential marketplace.



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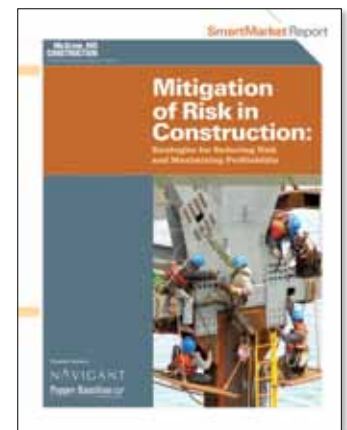
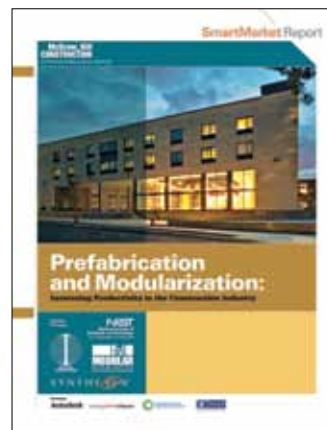
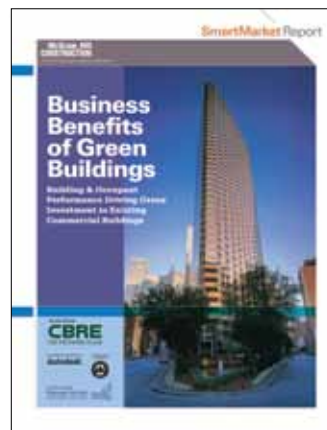
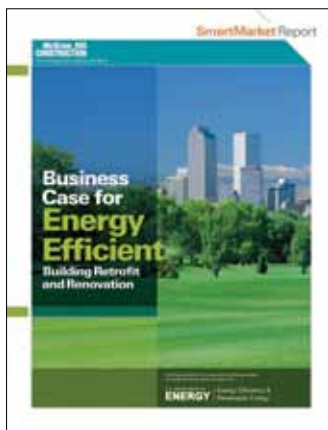
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