McGraw_Hill CONSTRUCTION

# The Green Homeowner

## Attitudes & Preferences for Remodeling and Buying Green Homes

## SmartMarket Report

*Design & Construction Intelligence*

**2007 The Green Homeowner Issue**

Produced in conjunction with the National Association of Home Builders

connecting people_projects_products

NAHB GREEN BUILDING SUBCOMMITTEE

NAHB National Association of Home Builders

# Introduction

## Harvey M. Bernstein, Vice President, Industry Analytics, Alliances & Strategic Initiatives, McGraw-Hill Construction

We are truly excited to present this latest issue of our *SmartMarket Report*™ series. This *SmartMarket Report*, supported by the National Association of Home Builders (NAHB), provides quantitative insights into the opinions and decisions of homeowners and remodelers when they are making the decisions to buy or build green.

It was a tremendous effort to delve into the consumer mind-set. Combining it with the findings from our study of the green home builder–found in the *Residential Green Building SmartMarket Report*, issued in 2006 with support from NAHB–we gain a complete picture of the drivers behind green building in the residential construction market. This understanding is important because green construction continues to expand at a more rapid pace from year to year.

The residential construction industry is of primary importance to the U.S. economy, contributing more than 4% of the GDP. It comprises more than 50% of all construction activity in the U.S. As a result, tracking residential green building is a critical part of understanding the economic opportunities posed by sustainable design and construction.

"Improving health and helping the environment led to the greatest satisfaction green home buyers had with their new homes."

However, there is another reason green homes are especially important to understand: They are the places in which we live, sleep and spend time with our families, where the quality of our air and the environmental impacts of our building materials matter most. With increasing public attention on what individuals can do to lower their environmental impact, we felt it was especially timely to understand those who have already made the choice to live green–whether through purchase of new green homes or through remodeling their homes sustainably.

As in all seven of the *SmartMarket Report* studies we have conducted into the green building marketplace, this research found that energy prices are an important catalyst for more green building. We also found that, like their home builder counterparts, green homeowners are motivated by their concern for the health of their families and their impact on the environment. In fact, improving health and helping the environment led to the greatest satisfaction green home buyers had with their new homes. It is clear that ethics are important to the future of this market.

For this report, we surveyed a representative sample of the 233 million households across the U.S. to find a representative group of green home buyers and homeowners remodeling with green building products and practices. Then, we explored who they were and what they thought, examining their motivations, opinions and preferences. We also analyzed those homeowners who are choosing to remodel their homes with green products and practices. With our housing economy struggling and mortgage rates increasing, more homeowners are electing to renovate their homes, making this market critical to understanding green building market opportunity.

We hope you find the latest in our green building market research as interesting as we do. Each time we delve into a new green building market, we find the results continue to point to this market growing in size and strength. As we move forward, McGraw-Hill Construction is committed to continuing to serve the construction industry as a leader in providing green building intelligence, resources and expertise through our publications, analytics work and the MHC Network database of construction projects and products.

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Harvey M. Bernstein, F.ASCE, has been a leader in the engineering and construction industry for more than 30 years. He is a member of the Princeton University Civil and Environmental Engineering Advisory Council, the Harvard University Joint Center on Housing Policy Advisory Board and the Partnership to Advance Technology in Housing (PATH) Industry Committee. Bernstein is also a visiting professor at the University of Reading's School of Construction Management and Engineering, where he also serves on their Innovative Construction Research Center Advisory Board. Bernstein is a frequent speaker at green conferences, including NAHB and the U.S. Green Building Council, where he presents information on the latest green market trends and research findings about the commercial and residential construction markets as well as information on the actions of corporate America. He has written numerous papers and reports covering innovation, energy conservation and sustainability in the built environment.

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# Executive Summary: The Green H

Results reported in *The Green Homeowner SmartMarket Report* are a combination of McGraw-Hill Construction's proprietary data, analytic and content expertise, as well information gathered by McGraw-Hill Construction (MHC) Research & Analytics Market Research Group from January 2007 to April 2007. For that research, a representative sample of the 233 million U.S. households was surveyed regarding recent purchases of green homes as well as remodeling with green building products and processes. For further discussion of the sample design, see page 21 under methodology. The sidebars and personal profiles presented herein, while excellent examples of the opinions of green home builders, homeowners and remodelers, do not represent the entirety of the green homeowner or remodeler market. Where applicable, research from other MHC green *SmartMarket Reports* are used for comparison or to provide additional insight.

## Green Building Market Opportunity

The total green building marketplace is expected to be worth up to $60 billion by 2010, with the green renovation market (both commercial and residential) at over $200 billion. In 2005, the size of the "true" green home building market was $2 billion and the size of the green home remodeling market was approximately $120 billion.

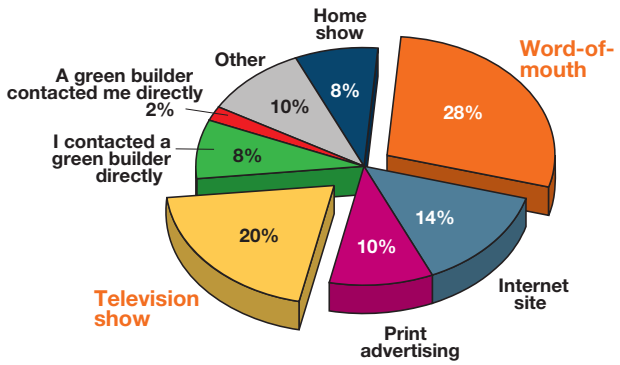
In a struggling housing market, green homes may help differentiate builders so they can stabilize their business. However, these advantages are only being seen by home builders who already have experience in green and a reputation for their work in this area.

Increasing government attention and policy, particularly at the local levels, will also help spur green building–both commercial and residential.

## Homeowner Intelligence About Green Homes

Awareness of green homes is moving toward a critical mass. Two-thirds of homeowners are aware of green building, with 8% extremely knowledgeable. This strong base is growing, with more and more Americans becoming increasingly educated about what it means to build green.

### How Buyers Hear About Green Homes




Source: McGraw-Hill Construction, 2007

## Expanding the Market

**The number one way U.S. green home buyers heard about their green homes was through word-of-mouth (28% of respondents).**

Other ways they gained green home information:

- Television (20%)
- Internet (14%)
- Print advertisements (10%)

The home builder was not a high source of information for the green home buyer, with only 2% of respondents citing that as the way they heard about their new green home.

## Profile of the Green Home Buyer

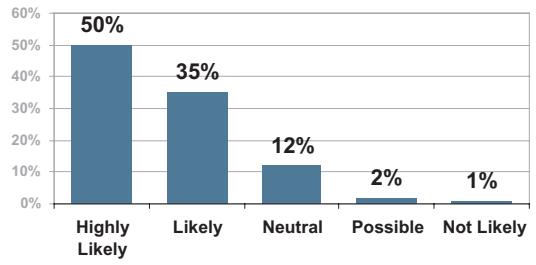
The study shows the following demographic characteristics of the green home buyer:

- Seventy-one percent are female, outranking men significantly.
- Two-thirds have an annual income over $50,000.
- Average age is 45. However, the age distribution is widespread, indicating that there is wide variation in the age of the green homeowner.
- More green homeowners are married and highly educated.

# omeowner and Remodeler

## Recommendations

Eighty-five percent of green homeowners are happy with their new green homes, and they are recommending those homes.




Source: McGraw-Hill Construction, 2007

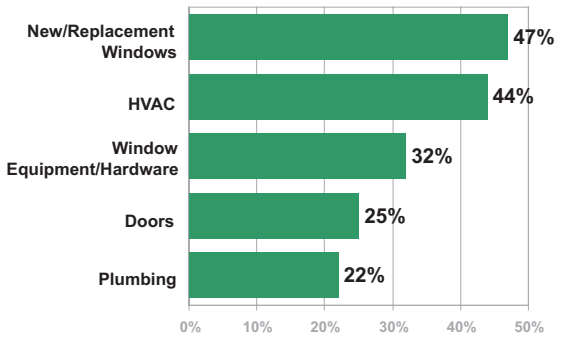
## Reasons and Challenges

The top reasons for buying a green home are operating cost savings, environmental concerns and family health, all within 5 percentage points of each other.

The most significant obstacle is education and awareness followed by higher first costs and lack of availability.

## Remodeling with Green

Nearly 40% of home remodeling is being done green, according to a representative sample of U.S. homeowners. Below is the list of the most-used green products.




Source: McGraw-Hill Construction 2007

## Strategies Recommended To Help Transform the Market

✓ **Educate consumers, homeowners, builders and product manufacturers about green home building practices and products.**

There is a gap in information with regard to green building in general as well as specific green products. Different from other customer segments, the homeowner sees lack of education as the number one obstacle to increased levels of green home purchase, above cost. Many different customer groups need information, but that information should be tailored appropriately.

✓ **Use personal relationships to maximize outreach since word-of-mouth is the most powerful method to influence market.**

Buyers found out about their green homes mostly through word-of-mouth. Furthermore, they are very satisfied with those homes and willing to share that information. Builders and public policy makers alike should use this opportunity for these green homeowners to help accelerate the market.

✓ **Use demographic awareness to reach target markets.**

By using this new understanding of the demographic groups that are having the most influence in today's green home market, builders and product manufacturers can create strategic and targeted information and educational programs. Especially important are women, homeowners in the western and southern U.S., those that make more than $50,000 annually, and those that have more than a high school education.

✓ **Understand all the motives prompting the actual purchase of a green home.**

While costs and energy efficiency matter, the message will not resonate with buyers unless they also feel good about protecting their families, the environment and society through their action. Keep this in mind when talking with potential buyers or the community at large. Do not forget the cost advantages, but keep other motivators in mind.

✓ **Consider promoting green home products.**

Nearly 40% of homeowners are remodeling with green products. This is a tremendous opportunity for manufacturers, suppliers and contractors to increase market share and at the same time increase green building overall.

# The Shift Toward Green

Green building refers to the careful design, construction, operation and reuse or removal of the built environment in an energy-efficient and environmentally sustainable manner.

**Terminology**

There has been debate about what constitutes a green home. For example, does the inclusion of energy-efficient appliances, a staple in many homes today, mean the home is green?

The research results presented in this report define a green home as one purchased between 2004 and 2006 and one that met a green building screening set up for the purposes of this study.

Specifically, homes needed to contain a specific green building element in three of the following categories:

- Energy efficiency
- Indoor air quality
- Water efficiency
- Resource efficiency
- Site management

The specific green elements that the homeowner cited in their homes were drawn primarily from the green building practices and procedures detailed in the National Association of Home Builders' Model Green Building Guidelines (**www.nahbrc.org/greenguidelines/**).

For more details on the study and its definitions of green homes, please refer to the methodology on page 21.

Throughout this report, the term "green building" or "green home" will be used to define the sustainable design and construction attributes of detached, single-family homes. Often, other terms, such as "high performance home" and "sustainable home," are used to describe these same concepts.

## The Change in Consumer Behavior

Though consumer behaviors are still dictated by brand loyalty and driven by cost, there is increasing evidence of changing patterns.

Recent research findings indicate the following:

- **Sales of organic foods are expected to grow 20% annually over the next few years.**[1]
- **The market for hybrid cars is increasing.**[2]
- **Socially responsible investing is on the rise.**[3]
- **Two-thirds of Americans say they consider a company's business practices when deciding where to buy.**[4]

With all the media attention on the need for environmental action and energy savings, it is not surprising that profiles of tomorrow's U.S. consumers indicate a more socially conscious buyer. According to a *BusinessWeek* article, 13- to 25-year-olds, members of the Millennial Generation (see box below for definition), report increased consumer support of socially responsible activities:[5]

- **Eighty-nine percent are likely to switch brands (given equal price and quality) to support a cause.**
- **Seventy-four percent are more likely to pay attention to messages of companies deeply committed to a cause.**
- **Sixty-nine percent consider a company's social commitment when deciding where to shop.**
- **Sixty-six percent consider a company's social commitment when recommending products.**

Evidence points to corporations attempting to capture and secure brand loyalty from this growing market of responsible consumers. Manufacturers of home building and remodeling products are making substantial commitments to creating, marketing and investing in green home products targeting both the home builder and owner.

Big-box retailers are also starting to embrace this market, providing details on green products for the home. These efforts by companies will also help accelerate the market for sustainable products and homes.

**Note on Generational Titles:**
William Strauss and Neil Howe, in their book *Millennials Rising*, coined the phrase "millennials" to refer to those born from 1982–2000.[6]

# Advantages of Green Homes

There are a number of reasons why homeowners should want to buy green homes. For example, poor air quality can be linked to increases in asthma and other respiratory conditions, use of toxic materials and their disposal may lead to increases in cancer rates, and use of energy and electricity leads to increased operating costs and air emissions that can affect climate change. Decreasing energy expenditures is perhaps one of the most significant reasons to build a green home because of its obvious payback advantages.

### Energy Savings

According to the U.S. Department of Energy, the average American family spends at least $1,291 on home energy per year.[7] **Green home features can lower energy expenditures by half.** With today's rising energy costs, energy-efficient green building features become more economical.

As can be seen at right, focusing energy-efficient features on space heating will have the greatest impact on energy savings.

### Tax Incentives and Rebates

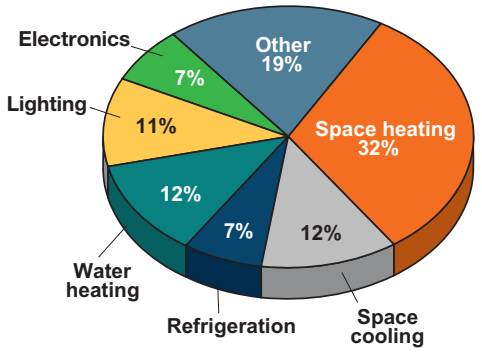
Many electric utilities provide incentives to homeowners who include energy-efficient appliances, products and other features in their homes.

Examples include Pacific Gas and Electric Company (**www.pge.com/res/rebates**) and Southern California Edison (**www.sce.com/RebatesandSavings/Residential/**). As can be seen at right, those living in the West consume the least amount of energy per household. It is possible that efforts by utilities, government and nonprofit organizations have played a role in helping decrease energy consumption in this part of the country. These efforts may serve as models for other regions.

The federal government also provides tax incentives through the Energy Policy Act of 2005 (**www.doe.gov/ taxbreaks.htm**).[8]

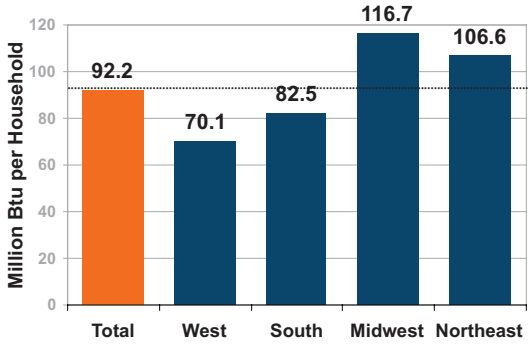
- Tax credit up to $500 for consumers who purchase and install specific products, such as energy-efficient windows, insulation, heating and cooling equipment, doors and roofs, in the home.
- Credits equal to 30% (up to $2,000) of expenses for qualified solar water-heating systems.

**Percentage of Energy Consumption per Household**
(national)




Source: 2007 Building Energy Data Book, U.S. Department of Energy, September 2007

**Total Btu Consumption per Household by Census Region**




Source: Energy Information Administration, 2001 Residential Energy Consumption Survey (RECS); Household Energy Consumption and Expenditures Tables

- Tax credits to eligible residential building contractors for homes meeting ENERGY STAR (**www.energystar.gov**) criteria.
- Tax credits for manufacturers of energy-efficient dishwashers, clothes washers and refrigerators.

# Green Home Building Market

## Outlook for Single Family Housing

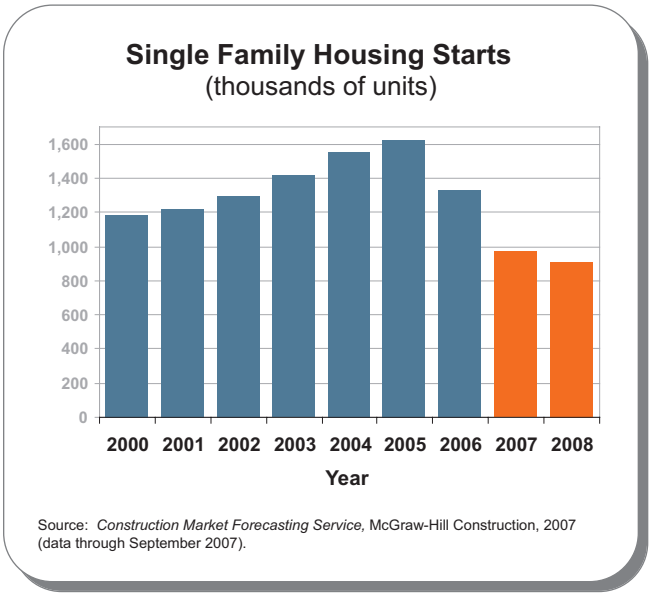
Single family housing achieved a record level in 2005 of 1.626 million units (see chart right), as several factors worked together to create extraordinary conditions on both the supply and demand sides of the market. In 2006, however, these conditions unraveled, causing single family starts for the U.S. to fall 18% to 1.331 million.[9]

By region, the most severe declines were reported in the Midwest and the West, followed by the Northeast and the South Atlantic. The South Central states in 2006 fared comparatively well, slipping just 1%.[10]

During 2007, the largest reductions have been reported in the South Atlantic (especially Florida) and the West (especially California).[11]

For the nation as a whole, single family housing was down 25% through the first eight months of 2007. By the end of 2007, there are estimates of the market sliding an overall 27% to 970 units. The actual annual decline may well turn out to be steeper.[12]

According to projections, declines in new home construction will continue into 2008, but not as steep as in 2006 and 2007. Initial indications suggest the market is likely to stabilize in 2009.[13]




Source: *Construction Market Forecasting Service,* McGraw-Hill Construction, 2007 (data through September 2007).

### Green Building Leading to Market Differentiation

In this down market, there is an indication that green building may serve to create market differentiation, enabling builders of green homes to be less affected by the downturn. Builders who have already established green building expertise and reputation seem to be faring the best at capturing this market advantage.[14]

With mortgage rates and energy prices on the increase, features that lead to decreases in costs are likely to be a selling point for consumers, and green homes can offer that advantage. Better insulation, energy-efficient appliances and other energy-saving features offer the most significant advantage.

However, in any market there still remains resistance to increases in home price–particularly when a home builder's margin may be at risk. In other buying markets, such as organic foods and hybrid vehicles, consumers are willing to spend more without the promise of a payback. This suggests that consumer education and marketing may resonate with consumers and increase demand, thereby creating a stronger foothold for the green home builder.

# Outlook for Residential Remodeling

As the single family housing market has seen significant drops over the last two years (expected to continue through 2008), the remodeling and renovation market has remained relatively consistent, valued at over $200 billion, and by most estimates over $300 billion.[15] This market size makes residential remodeling and renovation one of the largest construction markets, approximately the same size as the entire nonresidential construction segment. It is second in size only to the new housing construction market.[16]

With fewer home buyers, the residential renovation and remodeling market becomes more critical when determining market opportunity.

According to forecasts by Global Insight and the Home Improvement Research Institute, the residential remodeling forecast for 2007 is expected to be a slight 1.3% decline, but the long-term outlook for the market remains strong, with estimated growth of 5% annually over the next four years. They expect the market to reach $394.1 billion by the end of 2012.[17]

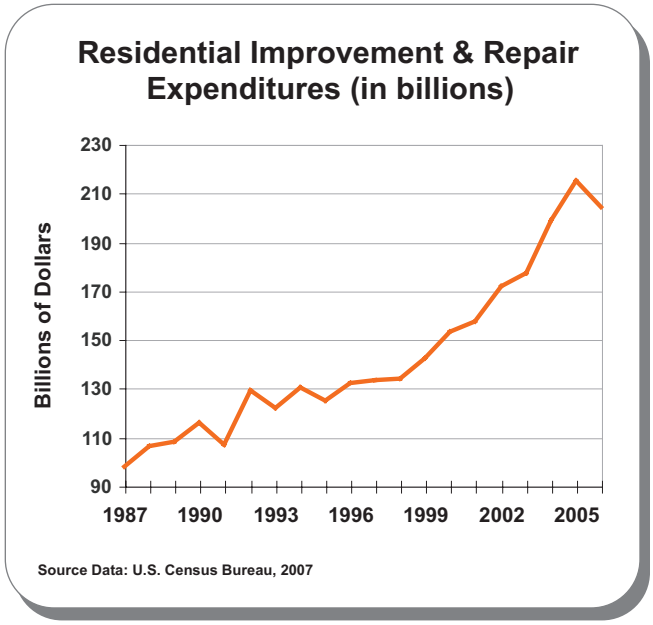
The Harvard University Joint Center for Housing Studies (JCHS) concurs, expecting to see the year end down 2% (nominal dollars)[18] and increases of 44% in inflation-adjusted terms between 2005 and 2015.[19]

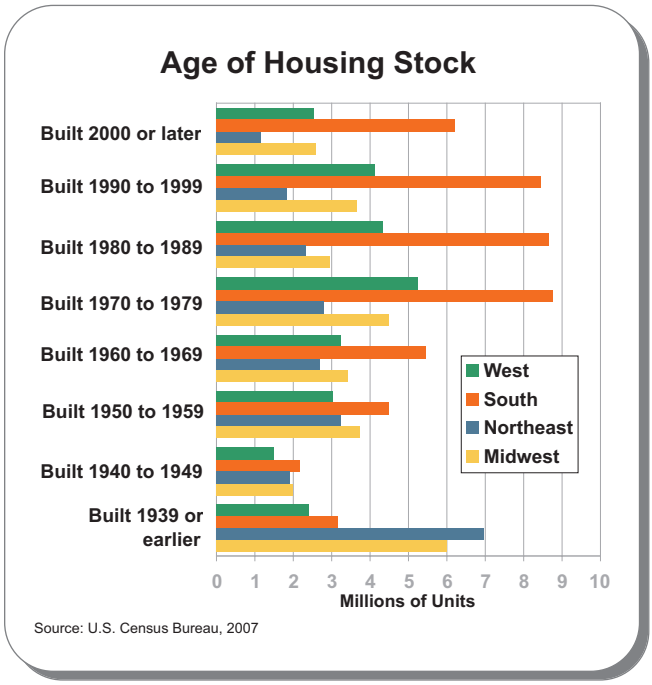
Green has market opportunity in this sector. According to the Harvard JCHS, rising energy costs are causing homeowners to put energy efficiency near the top of their remodeling concerns.[20]

### Examining Age

Age is also a factor in determining the opportunity for the remodeling market. As can be seen right, the Northeast has a disproportionate amount of housing built before 1939.[21] The Midwest also has a good stock of homes built in this early period,[22] which also happens to be the age of homes in the Midwest with the highest incidence of replacement of plumbing, cabinets and windows. That type of analysis offers additional insight into the location of the greatest opportunity for home remodelers and product manufacturers who are looking for key target areas for green building.

Greening this aging housing stock is also important because older homes are more harmful to the environment. They emit more carbon dioxide and other greenhouse gases, use significantly more energy and contain more toxic components than their newer counterparts.[24]



# Green Home Building Market

## Green Building Market Opportunity

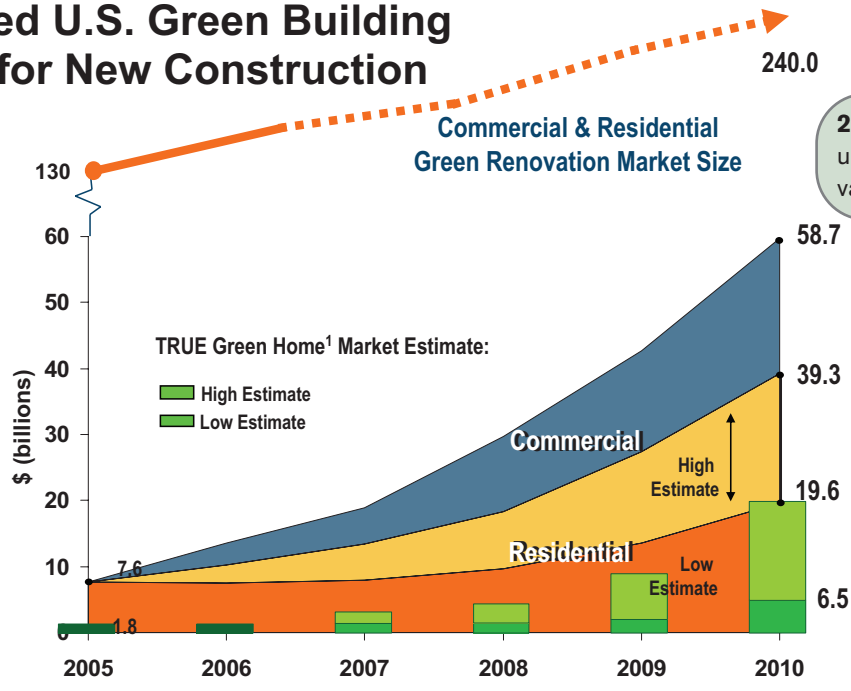
**The general outlook for green building is positive.** McGraw-Hill Construction research has pointed to growth in the entire construction market with regard to green building.[25]

Since MHC's research studies were released in the *Green Building SmartMarket Report* and *Residential Green Building SmartMarket Report*, more evidence has emerged pointing to the increasing foothold that green building, and sustainability in general, will have in the future. For example, schools and government buildings are being built increasingly green, which will have influence on public awareness of green building. Additionally, corporate America is also making an increased commitment to green building and sustainability in general. McGraw-Hill Construction found in its *Greening of Corporate America SmartMarket Report* (2007) that 82% of corporations would be greening at least 15% of their real estate portfolios by 2009.[26] Additionally, Turner Construction found that 87% of industry executives reported their green building activities increasing over the next three years, with 43% reporting a substantial increase.[27]

**The total new green building marketplace is expected to be worth nearly $60 billion by 2010** based on MHC's various studies (see chart below).[28] As of January 2007, that seems like a conservative estimate. Adding in the renovation market, the green building market size becomes nearly four times as large–again, creating significant market opportunity for the green designer, builder, contractor or product manufacturer.

Considering the incidence of green homes according to the more stringent definitions in this report (see page 6), this more narrowly defined "true" green home market was 0.3% of the construction market in 2005, worth nearly $2 billion. However, with market conditions as they are, the prices of green products dropping and the growing awareness of green homes, there is an expected increase over the next few years of these "true" green homes, leading to a market for residential green homes worth up to $20 billion by 2010. See page 6 for the categories of green building that constitute a "true" green home.

### Projected U.S. Green Building Market for New Construction Starts




**2010 Green Market:** up to 10% of building starts, valued at up to $60 billion

**2005 Green Market:** 2% of building starts, valued at $7.6 billion

Value of project starts shown excludes non-building and agricultural construction

[1] Green homes are defined more narrowly as homes that contain elements in 3 of 5 environmental building categories: energy efficiency, indoor air quality, water efficiency, resource efficiency, and site management.

## The Role of Government

In recent years, government has become more of a player at influencing green home building, particularly at the local levels.

To date, most government programs and policies have been voluntary, particularly at the federal levels. The federal government's focus remains mostly on energy efficiency with regard to improving the environmental impact of homes. Through successful programs such as ENERGY STAR (**www.energystar.gov**) and Building America (**www.buildingamerica.gov**), the government, primarily through the U.S. Department of Energy, has helped create a shift in consumer behavior, particularly with regard to energy-efficient appliance purchases.

**Incentives for Green Homes**
**Arlington, Virginia (www.arlingtonva.us)**

Since 2003, Arlington, VA's Green Home Choice program has helped to encourage homeowners, builders and renovators to choose techniques and materials to make single family homes green.

A few of the incentives include:

- Expedited plan review.
- Job site signs indicating green home status.
- Press releases and articles.
- Web site recognition.
- Development process assistance.

**Creating a Renewable Community**
**Sarasota, Florida (www.scgov.net)**

In 2006, Sarasota County, FL announced its designation as the first Renewable Community demonstration project in the nation, including transportation, residential and commercial buildings.

Specific elements:

- Zero-energy homes, using rooftop photovoltaic power-generating systems and other renewable energies.
- Plug-in hybrid electric vehicles.
- Financial incentives, such as cash rebates and tax rebates.

State and local governments are likewise involved in their own voluntary initiatives and incentive programs, though many of these remain focused on commercial construction. There are a few programs aimed toward homes, and those efforts seem to be increasing.

Some localities are starting to mandate green building. Though most regulations have pertained to government-owned buildings, there are increasing efforts aimed toward mandating green for private commercial and residential multi-family high-rise construction. A few of the cities that have already moved in this direction include but are not limited to: Boston, Mass.; Washington, DC; Babylon, NY; Pleasanton, Calif.; and Pasadena, Calif.

In some cases, regulations could affect government-funded housing. In Washington, DC, their rules also extend to district-funded housing,[29] and New Jersey has pending legislation that would mandate green for all affordable housing in the state.[30]

Other localities are beginning to adopt (though not yet mandate) green building standards. For example, Pleasanton, Calif. already has such standards in place;[31] Pasadena, Calif. is considering creating a standard.[32]

This push toward mandating green in the residential sector is also starting to come to fruition. Boulder, Colo. was the first locality to require compliance with the city's Green Points Building Program (**www.bouldergreenpoints.com**). The policy applies to all new residential construction as well as additions and remodelers larger than 500 sq.ft.[33] San Francisco has also proposed stricter green building rules to include requiring green building in residential and commercial buildings (it already mandates green building in public buildings).[34]

# Market Intelligence on Green Ho

The data reported in the following section (pages 12 to 21) are primarily drawn from the green homeowner research gathered by the McGraw-Hill Construction Research & Analytics Group from January to April 2007. The findings from the study are quantitative in nature with a 95% confidence interval with a margin of error of +/- 8.1%. For details on the sample and methodology, see page 21.

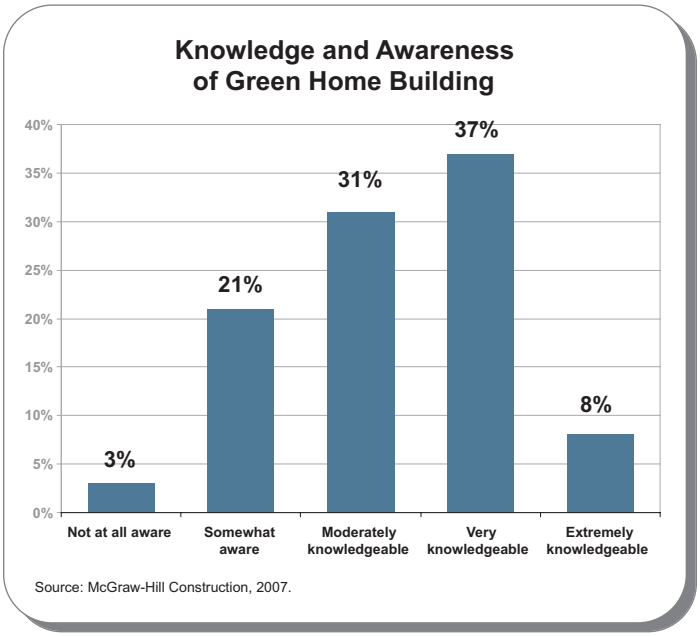
## Awareness of Green Homes

**Awareness of green homes is moving toward a critical mass.**

Examining the level of homeowner awareness of green homes, it is clear that most (75%) have knowledge, creating a strong base. Looking more closely at the distribution, it is clear that a critical mass is nearing.

The groups most knowledgeable on green homes include:

- Homeowners in the East and West.
- People between the ages of 25 and 44.
- Women.

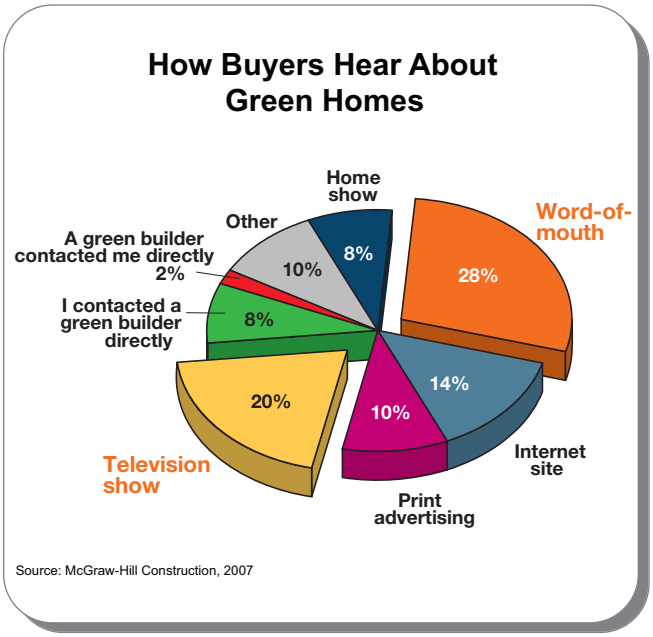


## Learning About Green Homes

**Most green homeowners learn about green homes through word-of-mouth.**

Word-of-mouth (28%) and television (20%) are the two primary sources for green home information, according to recent green home buyers, followed closely by the Internet (14%).

Home builders are only a source of unsolicited information 2% of the time. What is interesting about this finding is that according to a recent study released by the Partnership for Advancing Technology in Housing, organized by the U.S. Department of Housing and Urban Development (HUD), most builders see themselves as the information providers and drivers of new innovation.[35]




### Variations by Demographic

There are differences in how certain demographic groups hear about green building.

**Regional Variations:**

- Prospective home buyers in the West are much more likely to contact a home builder compared to buyers in other regions, with 21% of respondents claiming information from this source, compared to 3% in the South and none in the East and Midwest. They are also least likely to use television.
- In the South, television outranked word-of-mouth as the highest source for green home information, at 32% and 21% respectively. All other regions ranked word-of-mouth as the number one source for information.

**Age Variations:**

- Television becomes a less important source of information as education level increases.
  Its importance is 17% for college graduates; 23% for respondents with some college; and 33% for high school graduates.

**Gender Variations:**

- Word-of-mouth is a much more important method of acquiring information for females compared to males, 33% compared to 14% respectively.
- Men are slightly more likely to use television and information directly from builders for information.

### Changes over Time

From 2004 to 2006, there were some shifts in how homeowners gained information:

- Word-of-mouth overtook television as the most important way buyers first hear about green homes.
- Word-of-mouth and television account for the primary sources for 60% of respondents in 2006, up sharply from 38% in 2004.
- Print advertising has become less important as a source of information.
- The role of green builders as information providers has seen little change over time.

# Market Intelligence on Green Ho

## Green Homeowner Demographics

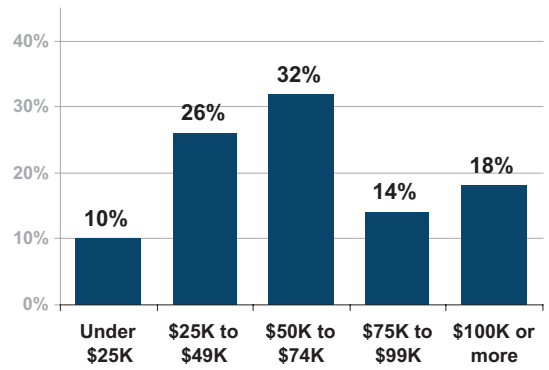
The study shows the following results:

- **Seventy-one percent are female, outranking men significantly.**
- **Two-thirds have an annual income over $50,000.**
- **Average age is 45. However, the age distribution (as can be see below) is widespread, indicating that there is wide variation in the age of the green homeowner.**
- **More green homeowners are married and highly educated.**

### Marital Status

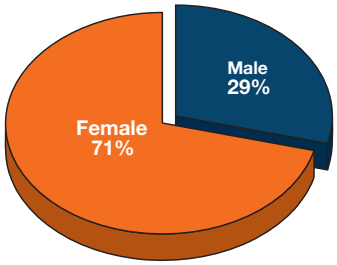
With regard to marital status, a significant 69% are married. Separating that number over time, it is clear that married couples purchasing green homes are on the rise, increasing 10% from 2004 to 2006.

**Green Home Buyer by Income Level**

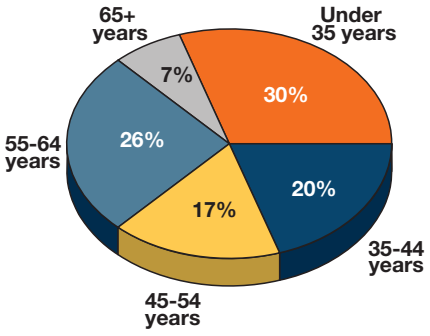



Source: McGraw-Hill Construction, 2007

**Green Home Buyers by Gender**

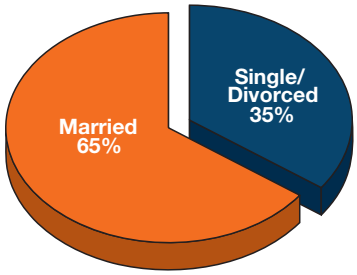



**Green Home Buyers by Age**

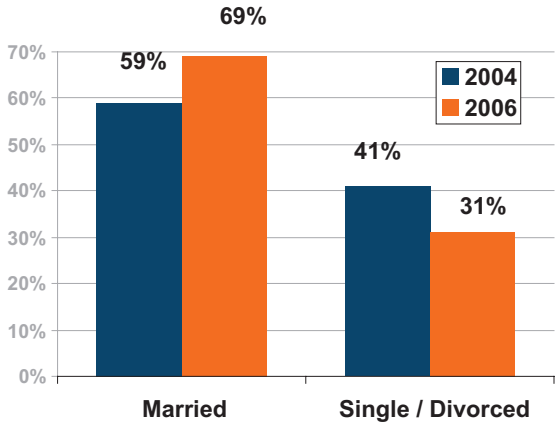



Source: McGraw-Hill Construction, 2007

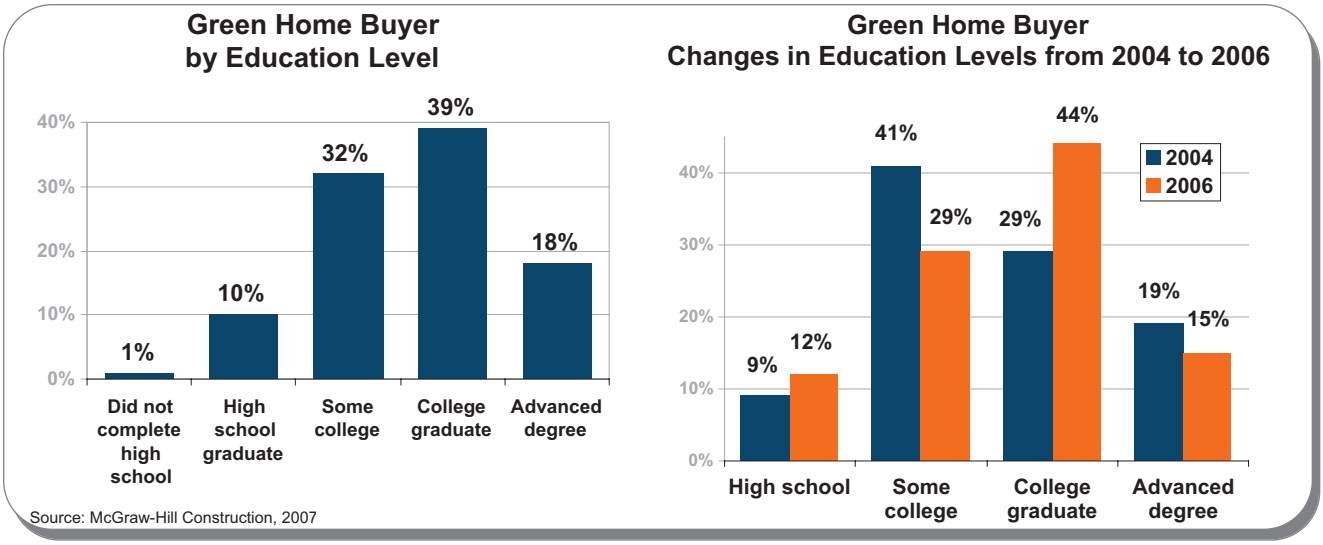
**Green Home Buyers by Marital Status**




**Changes in Marital Status from 2004 to 2006**




Source: McGraw-Hill Construction, 2007




### Educational Level

Green homeowners are highly educated, with nearly 80% having some college-level experience. Nearly 60% have college or advanced degrees.

Segmenting out the educational levels from 2004 to 2006, it is clear that more recent green home buyers have an increased level of education, with more completing college. As a result, marketing and sales strategies should be tailored to this audience in the future.

### Changing Ethics

As outlined on page 6, the ways consumers think and buy, particularly the next generation, is shifting to a more sustainable mind-set. Educational programs, such as Carnegie Mellon University's School of Architecture, are incorporating green building into their standard design classes. Universities are implementing campus-wide green building policies, and student groups are actively participating in these community efforts.

This Millennial Generation (i.e., those born from 1982–2000) was raised on recycling and corporate transparency, and these ethics will continue to push the consumer markets, including home buying. Young people are the future home buyers, and they are likely to continue to push the market toward more sustainable practices.

# Market Intelligence on Green Ho

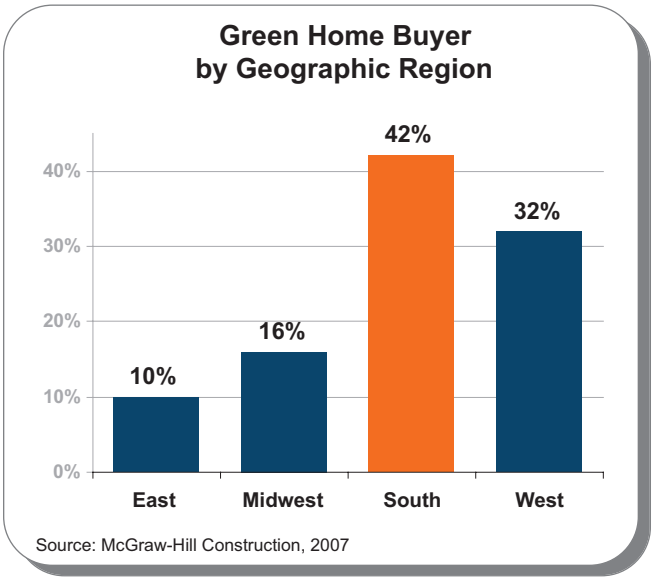
## Green Homeowner Demographics

**Most green building is occurring in the South and West.**

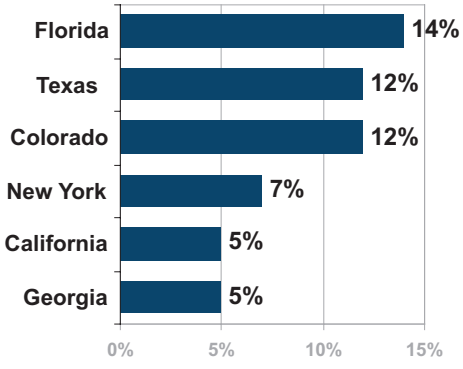
Below is a chart of the states where most green building is occurring. Given the strong local home building programs and government policies in Texas and Florida, the result that these are the top two states for green building is not surprising.

Some items of note:

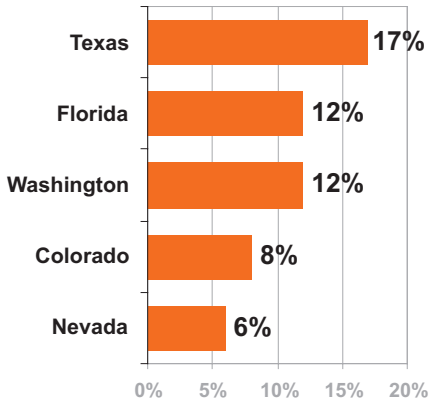
- Washington moved up the list in 2006, skyrocketing to the state with the third-highest percentage of green homes.
- Texas is also growing in percentage of green homes.
- Nevada moved up to the fifth-highest spot.
- California, New York and Georgia dropped out of the top five.




Source: McGraw-Hill Construction, 2007




Source: McGraw-Hill Construction, 2007




Source: McGraw-Hill Construction, 2007

## Lifestyle and Needs of the Green Homeowner

### Personal Attitudes and Preferences of Green Homeowners

Green homeowners are most likely to have the following interests and traits:

- **Interested in continuous learning and new experiences (79%).**
- **Active as a comparative shopper (76%).**
- **Enthusiastic about travel (73%).**
- **Interested in cooking (64%).**
- **Socially and politically knowledgeable (58%).**

Additionally, 40% of green homeowners are not at all interested in celebrities and television (compared to only 11% who are). Similarly, 32% do not have an interest in extreme sports (compared to 21% who are very interested).

Given these traits, it is important to recognize the unique attitudes and preferences of the green homeowner, since ads from celebrities are likely to have no more influence than price or product information.

### Ethics of Green Homeowners

Green homeowners are most likely to have the following ethics:

- **Very interested in protecting the family (68%).**
- **Focused on creating stable personal relationships (67%).**
- **Creativity (45%) and faith (43%) are also important.**

On the other hand, green homeowners are not motivated by adventure, status or wealth.

### Demographic Differences

There is some variation by demographic:

- Younger owners place a much greater importance on status compared to those that are older.
- Younger people are also interested in being adventurous.
- Buyers in the Midwest and South place more emphasis on faith.
- Midwestern homeowners tend to be less entrepreneurial.

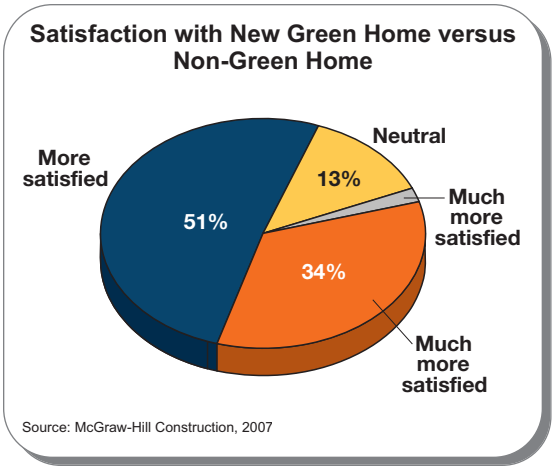
# Market Intelligence on Green Ho

## Benefits of Green Homes and Satisfaction Levels

**As can be seen at right, nearly all green homeowners are very satisfied with their green homes, which is not surprising.**

However, there are some differences with regard to demographics:

- Level of satisfaction increases with education level.
- Owners aged 45–54 and with annual incomes over $50,000 have higher satisfaction rates compared to others.
- Overall satisfaction is highest in the West compared to other regions.




### Perceived Benefits of Green Homes

More than three-quarters of green homeowners perceive many cost benefits from their new green homes. The top four benefits: lower long-term costs, short-term savings, lower health care costs and higher resale value.

### Satisfaction with Green Home Benefits

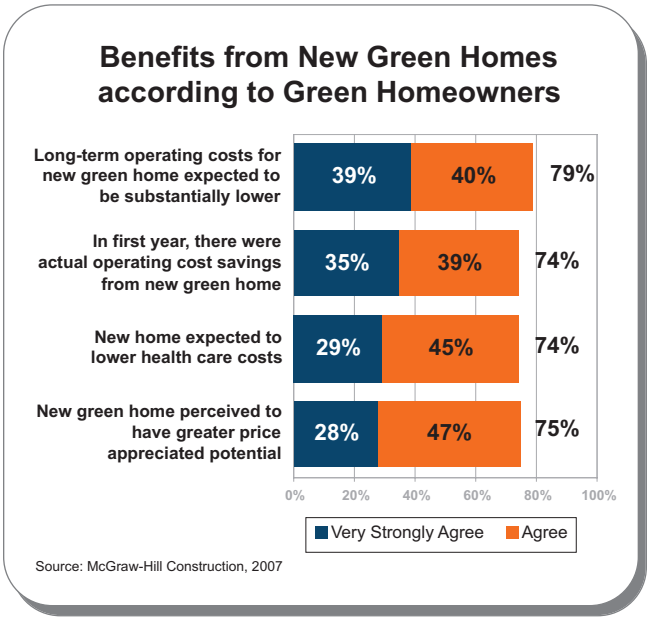
**The highest levels of satisfaction are related to health and well-being: better family health and improved air quality.**

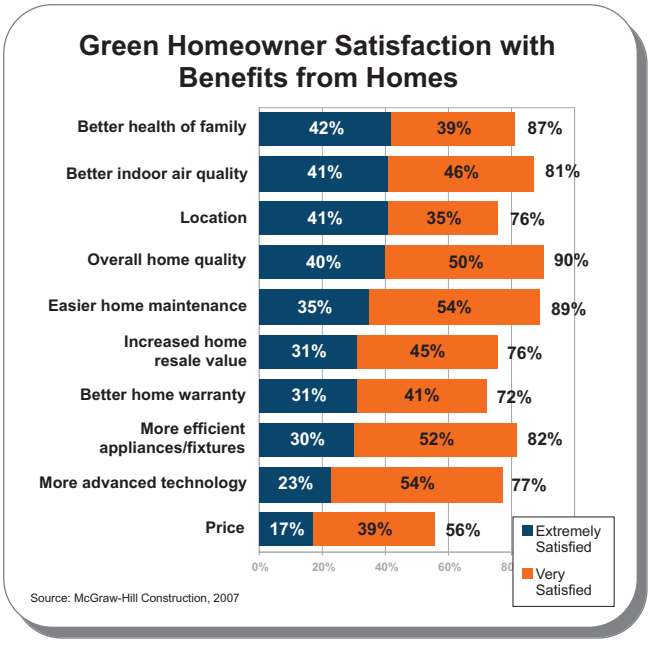
Overall, the top five benefits that bring the highest levels of satisfaction in order of importance are as follows:

- Home quality.
- Easier maintenance.
- Better indoor air quality.
- More efficient appliances/fixtures.
- Better health.

Not surprisingly, price has the lowest satisfaction level. Satisfaction with price was highest among those that are:

- Located in the Midwest.
- Earning higher incomes.
- Aged 25-34.
- Women.



## Promotion of Green Homes

**Eighty-five percent of green homeowners are likely to recommend a green home.**

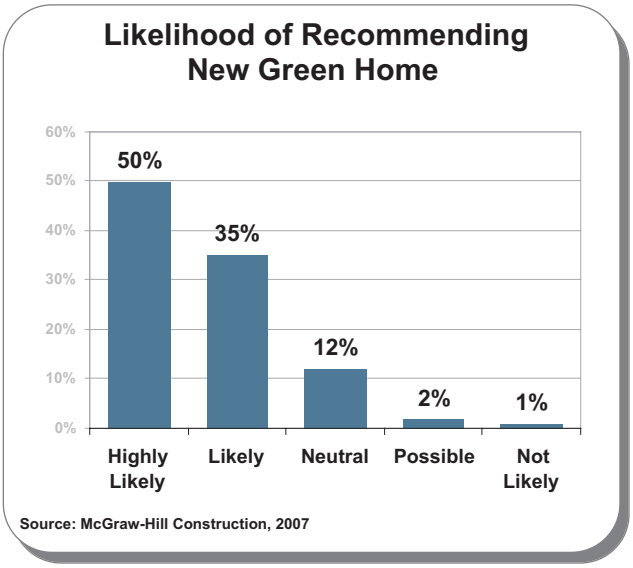
This finding is especially important given that most green home buyers learned about their green homes through word-of-mouth (see page 13).

It is likely due to their high satisfaction rates that green homeowners are recommending green homes.

Half of green homeowners are strong promoters of green homes and are likely to discuss their homes, compared to 21% that are less active in their promotion. This differentiation leads to a "net promoter score."

The net promoter score is a concept defined by Frederick Reichheld as a way of measuring customer loyalty and levels of word-of-mouth advertising. It is based on the level of likelihood a respondent will promote a product or service. The net promoter score is the difference between those that are extremely likely to promote minus those that are not at all likely to promote–or passive buyers/users.[36]

The average net promoter score (based on 130,000 customer surveys) for more than 400 companies in 28 industries is 16.[37] Green homes have a net promoter score of 29, well above the average. This result indicates that green homes are very likely to be actively promoted by their buyers.




This word-of-mouth advertising is important for builders and product manufacturers to cultivate in order to establish customer loyalty, capture market share and position their companies as leaders in green building.

### Promotion Levels Based on Demographic Breakdown

Below is a chart showing the demographic areas with the highest levels of green home promotion.

**Summary Table:**
**Demographic Segments with Highest Net Promoter Scores**

| | Age | Education | Gender | Annual Income | Region |
|---|---|---|---|---|---|
| Highest Promoter | 35 to 54 | College graduate | Female | $100K or more | Midwest |
| 2nd highest promoter | 25 to 34 | Some college | Male | $50K to $74K | East |
| 3rd highest promoter | 55 to 64 | High school graduate | | $25K to $49K / $75K to $99K | South |
| 4th highest promoter | 18 to 24 | | | Less than $25K | West |
| 5th highest promoter | 65 or older | | | | |

Source: McGraw-Hill Construction, 2007

## Reasons Behind Purchase of a Green Home

### Reasons Behind Green Home Buying

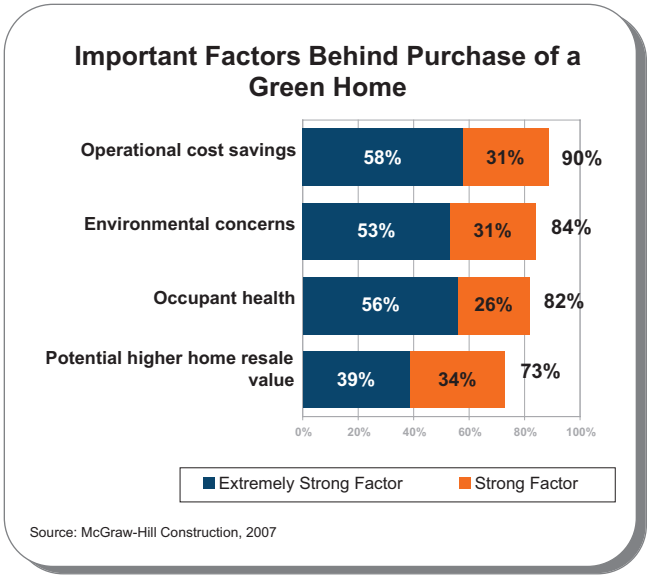
**The three strongest reasons behind purchase of a green home (represented by blue bars at right) are all nearly equivalent when looking at the most critical reasons for buying a green home.**

As can be seen at right, operational cost savings, followed closely by environmental concerns and occupant health, are all within 5% of each other, with 58%, 56% and 53% respectively when looking at the most important reasons to buy green (represented by the blue bars).

This implies that green homeowners are interested in economic concerns as well as the health of their families and improving the environment. Ethics are driving purchases just as much as economics.

**Demographic Differences:**

- All factors are equally important across all stakeholder groups.
- Health concerns of home occupants is most important in the South compared to other regions.



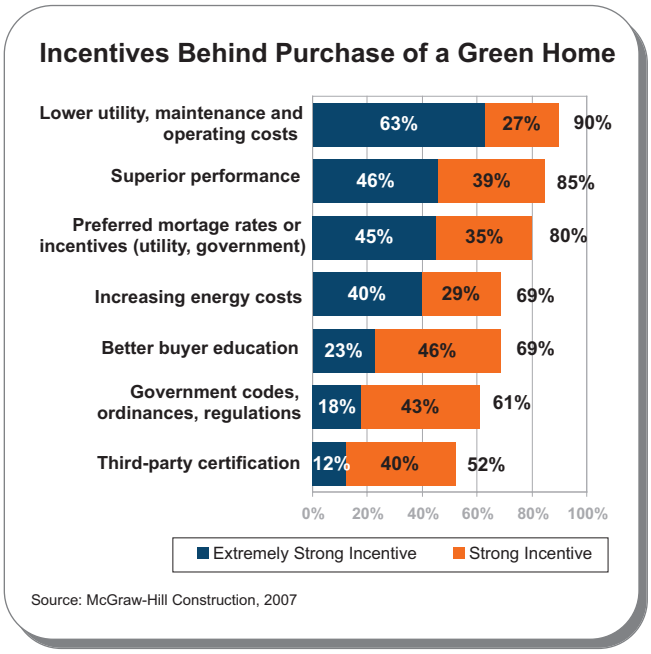

### Incentives to Buying a Green Home

A number of incentives can help accelerate the pace of green home buying, and many tap into the most important reasons behind such purchases.

As can be seen at right, lowering operating costs, superior performance and preferred mortgage rates can all help encourage more green building.

**Demographic Differences:**

- As age and income increase, buyers become more interested in lower operating costs.
- Energy prices are most critical to those located in the East.



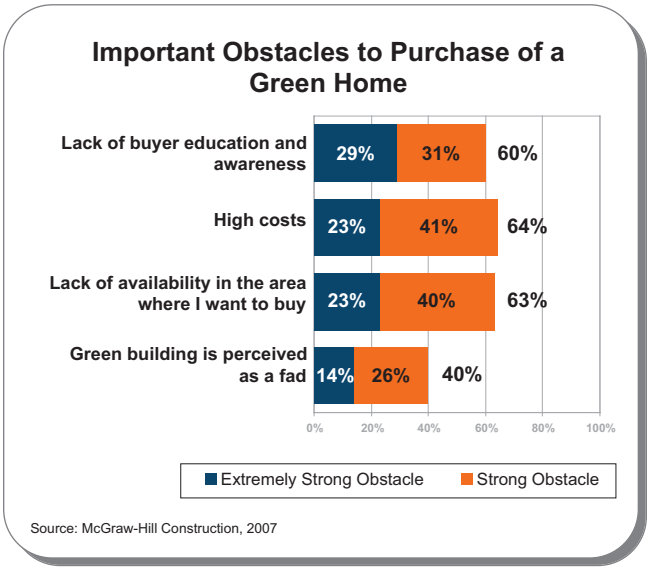
## Challenges To Purchasing a Green Home

**Respondents find education and awareness to be the most important obstacle (blue bar) to green home buying.** However, costs and lack of available green homes are close seconds, and are first and second respectively when looking at overall obstacles to purchase.

Comparatively, home builders perceived higher cost as the most significant obstacle to building green homes.

**Demographic Differences:**

- Younger buyers (25-35) find lack of education to be more of an obstacle compared to older buyers.
- People most likely to perceive green building as a fad: female, annual incomes over $100K, located in the East, over 65.
- Though it is important across all demographic groups, those in the East and with annual incomes over $100K find lack of green homes most challenging.




## Methodology

The research in this report was conducted under the direction and management of John DiStefano, Director of Market Research for MHC Research & Analytics. In this research, MHC sought to gain insight into the green homeowner and remodeler.

McGraw-Hill Construction used an online-based interviewing service to conduct data collection between January and April 2007. The total sample size benchmarks at a high rate of accuracy. For the homeowner part of the study, the confidence interval was 95% with a margin of error of +/- 8.1%. For the green remodeler study, the confidence interval was 95% with a margin of error of +/- 6.7%.

The sample for the green homeowner investigation was obtained using the following procedure: A screener was sent to 450,000 households (a representative sample of the 233 million households in the U.S.) to identify those households that currently live in a green home or have made green renovations to their existing home. A total of 115,885 responses were received (a response rate of 26%). From the total sample of 115,885 cited above, a total of 341 individuals indicated they had purchased a green home between 2004 and 2006. A follow-up questionnaire was sent to these 341 respondents, from which a total of 147 completes were received, a response rate of 43%.

The green home was defined as one containing at least one specific green building element in three of the following five categories: energy efficiency, resource efficiency, indoor environmental quality, responsible site management and water efficiency.

The sample for the green home renovator investigation was obtained as follows: From the total sample of 115,885 cited above, a total of 54,240 respondents indicated that they had undertaken one or more types of renovations or replacements in their home in 2006. Of these, 21,509 said at least one of these renovations or replacements had been "green." A follow-up survey was sent to a randomly selected sample of 569 of these 21,509 respondents, from which a total of 218 completes were obtained, a response rate of 38%. Products covered included windows, doors, plumbing, flooring, siding, roofing, cabinets and HVAC.

The use of a sample to represent the true population is based on the firm foundation of statistics. While many variables are factors in creating sample size, a key determinant is ratio of sample to total population. Both the AC Nielsen, which produces the Nielsen Television Ratings, and the Gallup Election polls use less than 1/100th of a percent to represent their national populations. (See AC Nielsen PeopleMeter at **www.nielsenmedia.com** and Gallup Polls at **galluppoll.com/**.)

# Talking Green Building: The Gree

## The Green Development: Armory Park del Sol, Tucson, Arizona

### John Wesley Miller Companies

When asked about when he first started to build green, John Wesley Miller will go all the way back to 1973. Therefore, it is not surprising that 35 years later, John Wesley Miller Companies has created "the most energy efficient residential development" called Armory Park del Sol, located within walking distance of downtown Tucson, Arizona.

Every home in the development–90 to date–qualifies under the U.S. Department of Energy (DOE) Zero Energy Homes Program, and the development includes a second generation "Net Zero Home"–one of four in the country administered by DOE through its National Renewable Energy Lab.

However, the fact that the "standard" house in Armory Park del Sol is 50% more efficient than the Model Energy Code is what makes the development so distinctive. Every home contains at least a 1 kWH solar electric system and a passive solar water heater designed to meet approximately half a family's water housing needs. The design is intended for the owners to use about 7 kWh/sq.ft. per year.

With regard to costs and savings, Miller talks about the seven to ten year payoff and the fact that the average electric bill for a homeowner in Armory Park del Sol is $55/month for a 1500–1600 sq.ft. home. He also points to the water efficiency of the development's homes.

All photos on this page and opposite © Adrienne Lake / John Wesley Miller Companies

Green Home Building Expert John Wesley Miller at Armory Park de Sol, Tucson, Arizona

According to a report by Global Professional Services, Inc. commissioned by John Wesley Miller Companies, the average home in Tucson uses more than twice the amount of water used by the average home in the development.

The development also includes community design that moves away from the concept of a single green home to that of a green community. Armory Park del Sol is an in-fill project, connected to the architectural history of the area, oriented for community interaction, within walking distance of the city's center and designed for residents of all ages. Its community space uses water-conserving landscaping and features native plants.

Miller talks about the state of green building and its future: "I see more and more green building happening. Now, even the larger volume builders are coming to green building council meetings. Our Southern Arizona Home Builder Association's Home Builder Magazine had a front cover on green building this month. That's a big change for the rank and file home builders."

A self-proclaimed "doer," Miller conveys a contagious excitement when he talks about his possible next venture. "We're looking at a major development that will have lots of neat aspects and be very green. And it will include 25% affordable housing."

# n Home

## Facts and Features

**Location:** Tucson, Arizona; downtown in-fill development
**Development Size:** 99 lot development; 2 remain for development
**Home Sizes:** 960 to 2,000 sq.ft.
**Home Prices:** from $500,000
**Date Broke Ground:** 2001

### Green Home Features

- At least 1 kWh solar electric system.
- Passive solar water heater.
- Thermal mass solid concrete block walls.
- Energy-saving appliances and mechanical equipment.
- High-performance windows.

### Performance Design

- Designed to use approximately 7 kWh per square foot per year.
- Exceed the Model Energy Code by 50%, which meets the criteria for U.S. DOE's "Zero Energy Home."
- Use approximately half water of similar home elsewhere in Tucson.

### Green Feature Costs

- Approximately $10,000 - $11,000 for photovoltaic systems.
- $5,500 for solar hot water, including tankless backup.

## The Net-Zero Energy Home at Armory Park del Sol

### Partners

- John Wesley Miller Companies
- National Association of Home Builders Research Center
- U.S. Department of Energy National Renewable Energy Lab

### Features

- Designed to use about 4 kWh per sq.ft. per year.
- 3.5 kW solar electric system and active solar hot water system to provide nearly all of a family's water and home heating needs.
- Credit from Tucson Electric Power for energy fed back to the power grid.

*John Wesley Miller has been building homes in Tucson, Arizona for more than fifty years. He is a national leader in energy conservation and green building practices with a number of awards and recognition. Most recently, he was awarded the Arizona Innovation Award by Arizona Governor Napolitano. For more information, visit* ***www.johnwesleymillercompanies.com*** *or* ***www.armoryparkdelsol.com****.*

# Talking Green Building: The Gree

## Green Restoration: Asdal Cottage, New Jersey

### Asdal Builders, LLC

First costs are often the obstacle stated as the biggest challenge to an increase in green home building and buying, but Bill Asdal says that he doesn't only talk about costs to his prospective customers. He talks about choices. "We as a society fail at making decisions. What I do is go through a core decision-making criteria that includes weighting. Everyone has a hierarchy of things that are important to them. Once we figure that out, then we can talk about features and costs that meet their needs."

Asdal also points to consumer-friendly government incentives as important in accelerating green home building.

But it is innovation that excites Asdal: "It's exciting to find solutions, fill in the gaps." Therefore, it is not surprising that his restoration in Chester Township, New Jersey features new technologies and methods. For example, his 'Asdal Cottage' project includes a geothermal horizontal loop installed in a "helix" shape.



### Facts and Features

**Location:** Chester Township, New Jersey
**Original House:** 1735 Stone Bank House, Second floor added in the Civil War period

**Overview of Work**

- Removed and rebuilt second floor.
- Gutted first floor to rebuild.

**Features**

- Air sealing.
- Venting upgrades.
- Geothermal ground source heating–horizontal loop.
- Solar ceiling fan.
- Solar attic fan.
- Radiant heat in a stamped concrete slab.
- Whirlpool high efficiency appliances.
- Restored and air sealed 1918 Kalamazoo kitchen stove.

*Bill Asdal has been providing quality building and remodeling services since 1973, while staying on the leading edge of industry change. Asdal currently serves as Chair of the Industry Committee for the Partnership for Advancing Technology in Housing. For more information, visit* ***www.asdalbuilders.com****.*

# n Home

## New Green Home: The Pedersen Residence, Kirkwood, Missouri

### Belcher Homes

According to Matt Belcher, his clients, the Pedersens are typical "empty nesters" who were looking to find a location closer to the St. Louis metropolitan area. They were not necessarily looking for a green home when they found the Kirkwood community.

And this is not an atypical client for Belcher: "About half our clients that come to us are like the Pedersens. They are not necessarily in the market specifically for a green home, but when they are able to see that they can make their investment better, they usually want to do it."

Belcher continues, "Others are looking for green homes to lower energy and operating costs, and of course, to enjoy the healthier benefits."

Pedersen, for one, has some results to make him feel better about his investment: In the first three months alone, his investment is already paying dividends with bills that are 40% lower than their previous residence. Their cost savings is particularly powerful considering that their prior residence had the same floor plan as their new green home.

As this study and others have pointed out, green building is part of a set of lifestyle choices and ethics. It is no wonder, then, that Ms. Pedersen is now engaging in native landscaping and volunteering to help sustainably landscape common areas of the community, thereby spreading the word and the sense of community that green homes can foster.

*Matt Belcher is founder and president of Belcher Homes, a leading green building company in the St. Louis area. Belcher is a recognized expert on environmentally-friendly homes, a member of the 2007 NAHB Board and an active participant in many green building organizations. For more information, visit* ***www.belcherhomes.com****.*



### Practices and Products

**Location:** Kirkwood, Missouri
**Home Size:** 2,600 sq.ft.
**Lot Size:** 1.4 acre
**Cost:** mid $400,000s (comparable to other homes in area)

**Green Building Practices**

- Windows reconfiguration to add glass to the south facing elevation and glazing minimized to the north to allow more daylighting.
- Velux Sun tunnels in the master closet and laundry room for natural light.
- Wrap-around porch to help shade west facing windows.
- Used Enercept Structurally Insulated Panels to construct exterior walls and walk-out wall along with a conventionally engineered roof trussed roof assembly.
- Insulated with a two inch skim coat of Icenyne insulation and spray cellulose insulation to achieve a minimum R Value of R-40.
- An engineered floor system was installed using engineered floor joists and Advantech engineered sub floor sheathing.
- Beam central vacuum system to exhaust outside the interior envelope.
- Geothermal system with additional storage tank to enhance hot water use and digital setback thermostats. The wells for the Geothermal system were drilled under the future driveway location and the piping run underground into a lower level mechanical area.

**Products**

- All low-e, Argon filled windows and door glass, sealed with OSI
- James Hardie fiber-cement siding
- Kohler low-flow fixtures/faucets; Cimarron low-flow toilets
- Whirlpool appliances
- Compact fluorescent lightbulbs
- First floor: FSC certified hardwood from Smith Flooring (local)
- Wet area flooring: ceramic tile
- Lower level: Shaw Industries Green Label carpet
- Sherwin Williams "Harmony" no-VOC paint

# Market Intelligence on Green Ho

The data reported in the following section (pages 26 to 31) are primarily drawn from the residential remodeling research gathered under this green homeowner study conducted by the MHC Research & Analytics Group from January to April 2007. The findings from the study are quantitative in nature with a 95% confidence interval with a margin of error of +/- 6.7%. For details on the sample and methodology, see page 21.

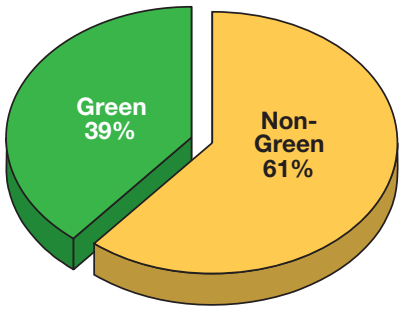
## Green Home Remodeling Market

Nearly 40% of today's homeowners undertaking remodeling projects are doing so with green products. There are a number of factors that may be influencing this increase including increased education, government programs and policies, more accessible and available online information, rising energy prices, and increased media attention on personal environmental actions.

Windows and heating and cooling products top the list of remodeling products being replaced with greener choices, as noted in the chart below.

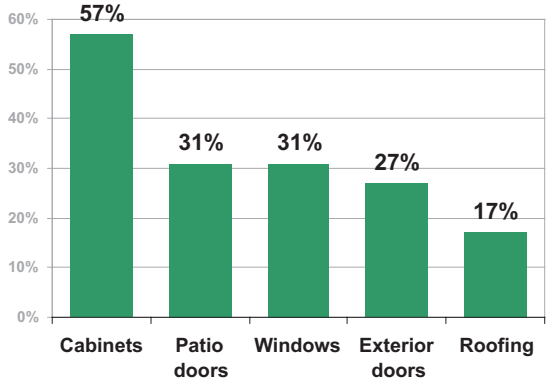
When taking into account those products that homeowners tend to replace themselves (see below left), it is clear that there remains market opportunity for products sold directly to consumer as well as to contractors.

### Percentage of Homeowners Remodeling with Green Products



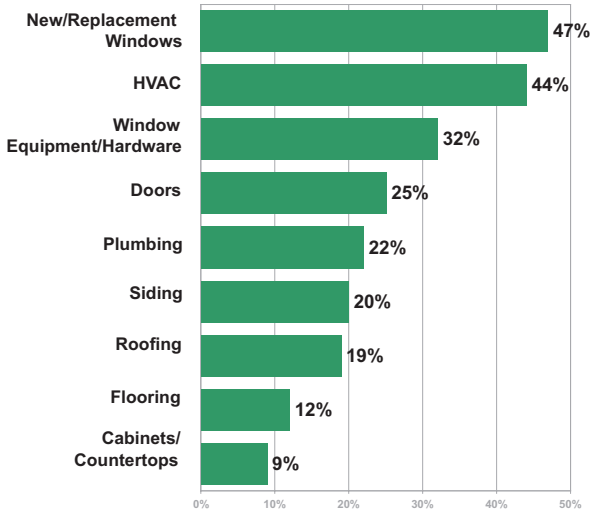

Source: McGraw-Hill Construction, 2007

### Percent of U.S. Homeowners that Do Their Own Remodeling by Product




Source: *Residential Remodeling Special Sector Study*, McGraw-Hill Construction, 2007

### Most-Used Green Products for Home Remodeling Projects




Source: McGraw-Hill Construction 2007

## Windows

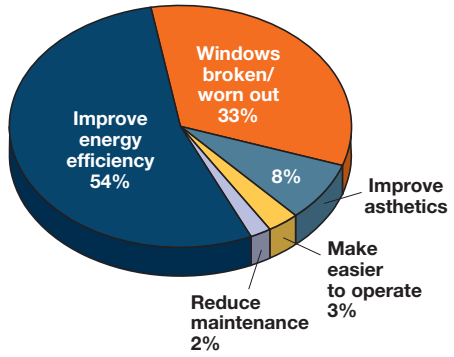
Windows top the list of products homeowners are replacing with greener choices. The findings are not surprising given that 54% of a representative sample of homeowners report that they replace their windows in order to improve their home's energy efficiency.[38]

### Replacing Windows with Green Alternatives

There are different types of windows being replaced–vinyl, wood and aluminum.

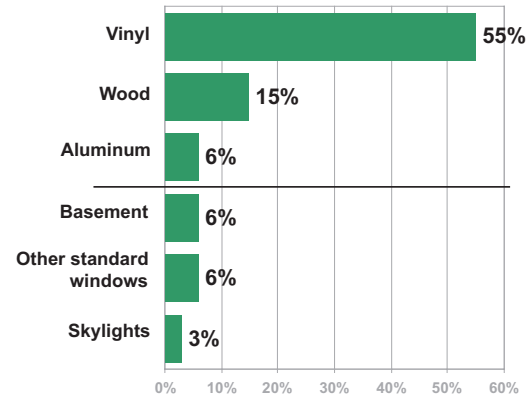
Of new windows, the ones most likely to be replaced with greener options are vinyl. With regard to window equipment and hardware, window panes and screens both rank high.

**Reasons Homeowners Replace Windows**



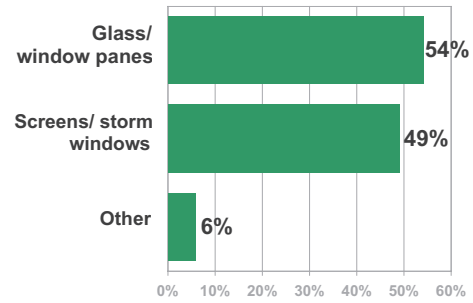

Source: *Residential Remodeling Special Sector Study,* McGraw-Hill Construction, 2007

**New Window Product Types Most Likely to Be Replaced with Green**




Source: McGraw-Hill Construction, 2007

**Window Hardware Product Types Most Likely to Be Replaced with Green**




Source: McGraw-Hill Construction, 2007

However, it is important to note that this survey did not investigate why these products were replaced with green alternatives nor the products that they were replaced with. These questions suggest additional research is needed to gain full market awareness.

### Recommendation Levels for Green Windows

Windows also rank high when looking at recommendation rates and net promoter levels (see page 19 for an explanation of net promoter scores), suggesting that homeowners are talking about their new green windows.

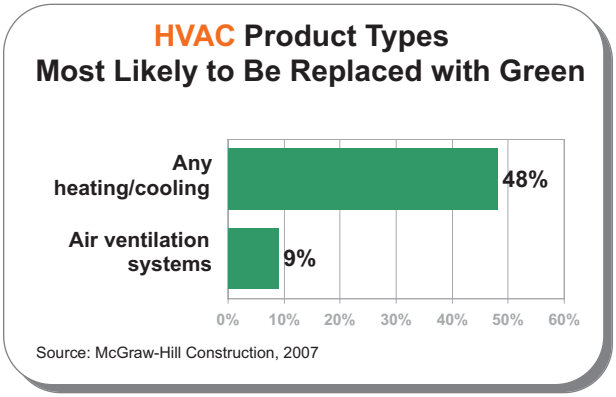
For green window equipment hardware, such as windowpanes, 49% of home remodelers highly recommend their green products, producing a net promoter score of 23, which is above the average for other products.

For new green windows, 39% highly promoted their windows with a net promoter score of 12, at about the average.

# Market Intelligence on Green Ho

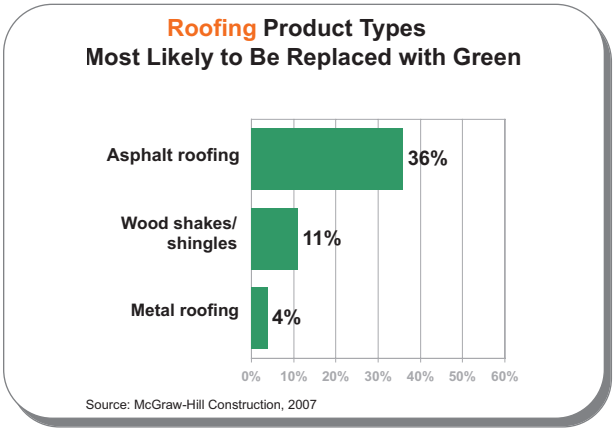
## HVAC

Not surprisingly, heating and cooling systems are among the most likely to be replaced with green alternatives. This is most likely due to the increased energy efficiency resulting from more environmentally friendly products.



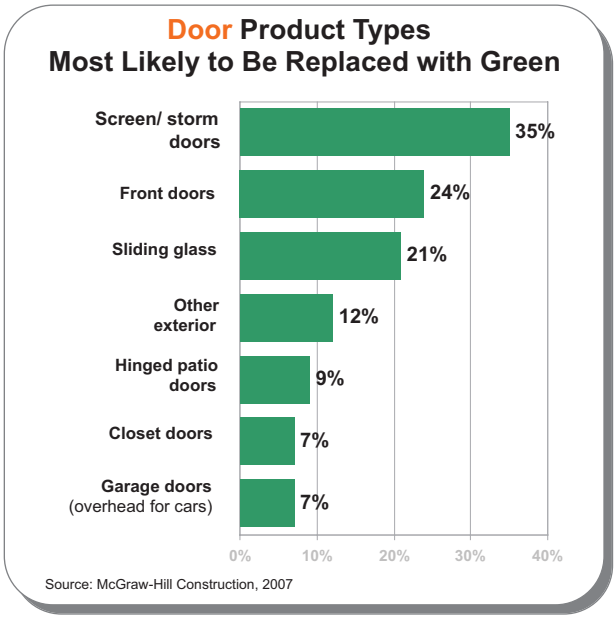

## Roofing

Respondents are most likely to replace their asphalt roofing with green products.




## Doors

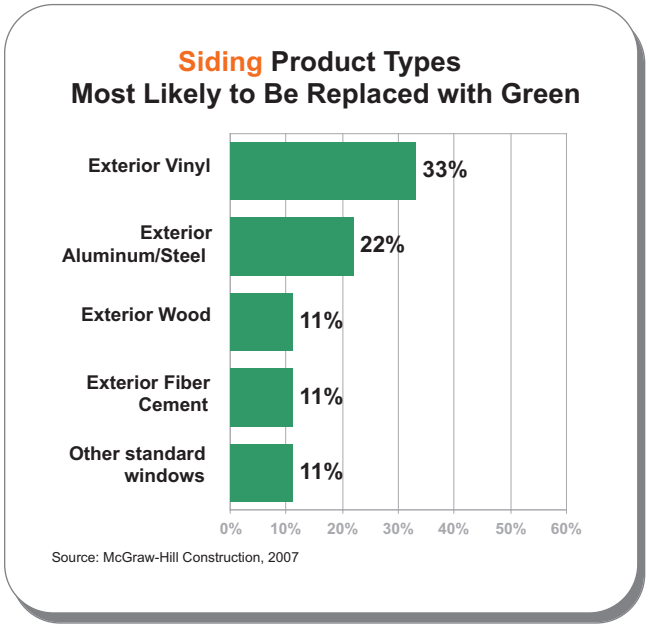
A number of different doors are replaced with green alternatives. However, interior doors such as closets are least likely to be replaced. This result is not surprising given that homeowners are looking for products that lead to energy cost savings. Exterior doors are more likely to provide this benefit.



# me Remodeling

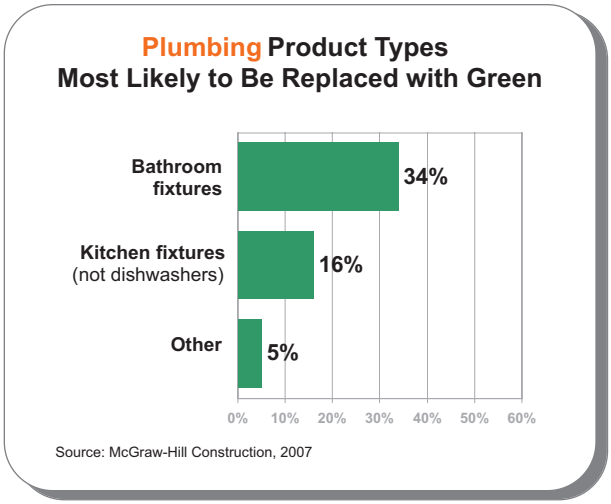
## Siding

As in window replacement, vinyl is the most likely to be replaced by a green alternative, though it was closely followed by metal siding (e.g., aluminum, steel).




## Plumbing

Bathrooms are the place where plumbing fixtures are most likely to be replaced with green alternatives. This result is not surprising given that 65% of home water use occurs in bathrooms.




## Recommending Green Home Building Products

Homeowners are recommending their green homes at higher rates than industry averages. Similarly, green windows and equipment (e.g., screens) also rank high with regard to active promotion by their users.

However, the other green products are not as highly mentioned by their users. This result does not necessarily indicate satisfaction levels. It merely suggests that homeowner/remodelers are more passive in their discussions about their green products in areas like plumbing, heating and cooling and roofing.

There are a number of reasons that could explain that passivity. Product categories that are not visible, like HVAC systems and plumbing, are not as appealing for discussion compared to features of a home that are–like windows and doors. Also, features that directly lead to improved health and internal energy efficiency may be more interesting for a homeowner to discuss, which may explain why green windows, doors and HVAC systems are more often recommended compared to plumbing, roofing and flooring replacements.

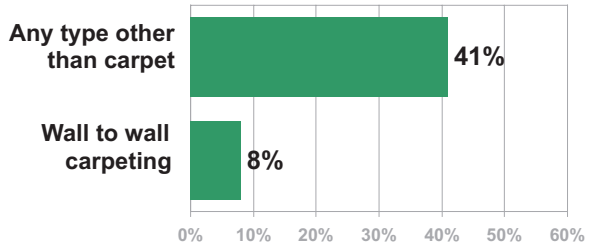
As a result, it is evident that research is needed to determine what drives consumers to recommend certain products over others, particularly with regard to green.

# Market Intelligence on Green Ho

## Flooring

Homeowners are more likely to replace tiles, linoleum, wood and other non-carpet flooring with green products compared to carpet in their homes.

**Flooring Product Types Most Likely to Be Replaced with Green**



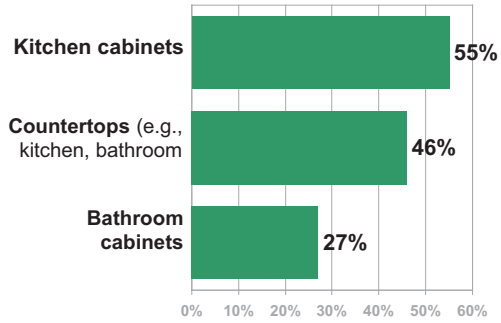

Source: McGraw-Hill Construction, 2007

## Cabinets/Countertops

Kitchen remodeling projects receive more attention when it comes to renovations with green products. Kitchen cabinets are most likely to be replaced with green at 55%, followed by countertops at 46% and bathroom cabinets at 27%. Though bathroom cabinets have the lowest levels of replacement with green, they still had a relatively high level of green replacement. This finding suggests that homeowners are very open to green products in this product category.

Given that 57% of homeowners replace cabinets themselves (see page 26), this may be an ideal green product area for direct-to-consumer marketing.

**Cabinetry/Counters Most Likely to Be Replaced with Green**




Source: McGraw-Hill Construction, 2007

## Green Product Brand Awareness

Being identified as a green brand is important for product manufacturers to capture market share in this burgeoning area, particularly as homeowners increase the number of their remodeling projects.

When answering what brands they identify as green, homeowners most often answered the brands indicated below (by product category). This top-of-mind question is useful in identifying which brands' marketing messages are reaching the consumer and driving sales.

The relative size of the circles below indicates how much of a gap exists between the listed top brand and other brands that might have been mentioned in that product category.

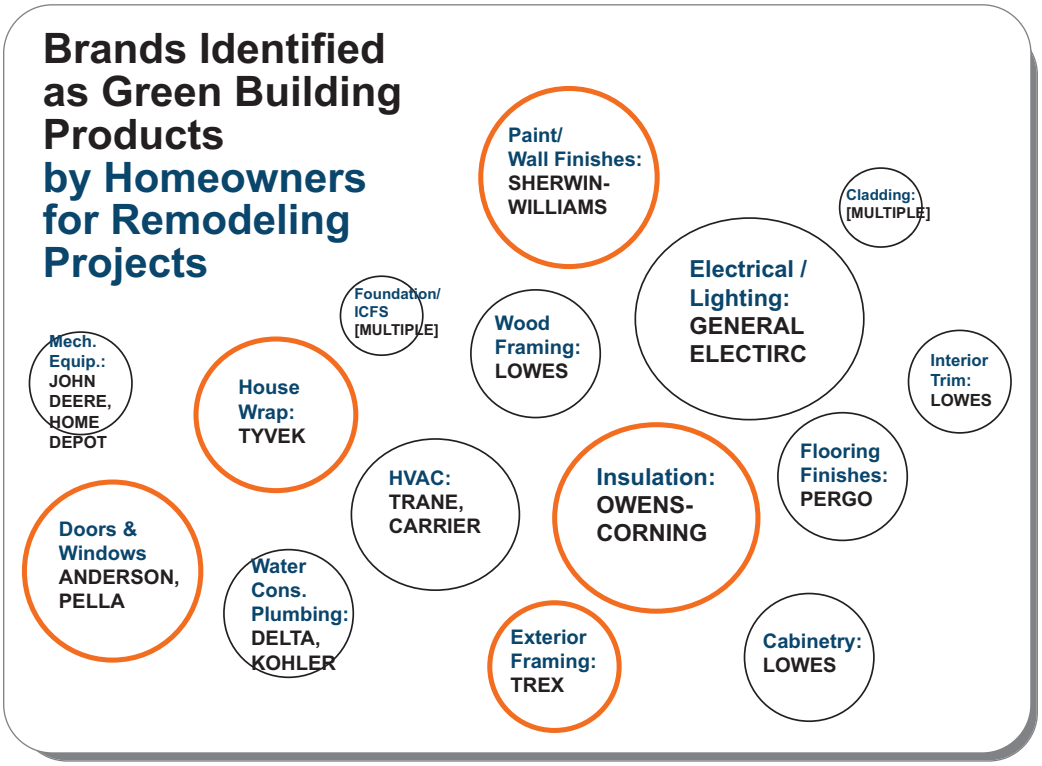
General Electric has the largest lead over other brands in the electrical and lighting product category. Other brands sharing significant leads over other brands include:

- Insulation: Owens-Corning
- Windows and doors: Pella and Andersen
- Paint/wall finishes: Sherwin-Williams
- HVAC: Trane and Carrier
- Housewrap: Tyvek

Those product categories with the least green brand affiliation include cladding, foundations, interior trim and mechanical equipment.

Though rarely the top brand, firms like Home Depot and Lowe's are represented in nearly all the different product categories as a top five recognized green brand. [Please note: The chart below only lists the top cited brand in each category.] The presence of Home Depot and Lowe's in a number of different categories suggests their importance in the residential remodeling market and the role they can play in the expansion of green building efforts.

There was some similarity with the brands identified as green by home builders. The categories (illustrated with a orange outline in image below) where builders and homeowner agreed were housewrap, insulation, doors and windows, paint/wall finishes and exterior framing.[39]



# Talking Green Building: Green Ho

## Green Remodeling and Renovation: Seville Bungalow, Atlanta, Georgia

Seville Consulting

Industry experts agree that when remodeling an existing home to be green, it makes the most sense to seal the existing structure to give it as tight an envelop as possible. Take Carl Seville's advice: "In my opinion, spray foam insulation is one of the most effective ways to make your home healthy and efficient."

How a homeowner gets their hot water is another area where efficiency can be addressed. Tanked hot water heaters–standard in most homes–are inefficient as they constantly reheat the water whether or not it is used.

When Carl Seville performed an EarthCraft renovation (**www.earthcrafthouse.com**) on a 1918 bungalow, he engaged both in the low-hanging fruit activities like air sealing and adding energy-efficient appliances and lighting as well as more significant green changes.

His results have been impressive, seeing utility bills lower than homes half the size, improved indoor air quality with lower levels of dust and reduction of sound pollution.

© Warren Bond, photo provided courtesy of Seville Consulting

© Warren Bond, photo provided courtesy of Seville Consulting

### Facts and Features

**Location:** Atlanta, Georgia
**Layout:** Single family, five bedroom, detached garage
**Home Size:** 4,700 sq.ft. (expansion from 2,300 sq.ft. by finishing attic and small addition on first floor)
**Cost/Square Foot:** $100

**Overview of Work**

- Expanded home from 3 to 5 bedrooms.
- Transformed kitchen into casual eating and gathering area.
- Added a small front addition to first floor.
- Converted the attic into a second floor.
- Screened porch constructed at rear of house to provide unconditioned space.

**Green Building Features**

- Air sealing.
- Daylighting designs.
- ENERGY STAR appliances and lighting throughout home.
- Low VOC paint, wood floor finish and carpet.
- Comprehensive drainage plane on all exterior walls.
- Ground unpainted lumber, waste bricks and roof tiles for mulch or driveway underlayment.

**Performance**

- Improved performance test from .76 ACH to .24 ACH.
- Reduced gas use by two-thirds; reduced electricity use by half.
- Sixty-eight percent higher heat and hot water efficiency.
- Fifty-four percent more efficient cooling and lighting.

*Carl Seville provides green building and remodeling consulting services for contractors, homeowners, and organizations; education, training, and presentations to industry and consumers, and general construction business consulting for contractors. For more information visit **www.sevilleconsulting.com**.*

# me Remodeling

## The Products

### Flooring
- Bona Kemi Traffic water-based finish to retained and new oak strip wood floors
- CRI green labeled carpet and pad
- Forbo Marmoleum

### Ceilings and Insulation
- USG drywall
- Icynene spray foam

### Wood and Wood Substitutes
- Boise Cascade Engineered Lumber
- Advantech floor decking
- Georgia Pacific Dens Glas Silver exterior wall sheathing
- Versatex PVC exterior trim

### Roofing
- Grace Ice and Water Shield underlayment
- Reclaimed and reused Ludowici Clay Tile
- Kynar coated standing seam metal roof
- Tri-Flex roof underlayment

### HVAC and Appliances
- Amana gas furnaces and air conditioning
- Kitchenaid ENERGY STAR rated kitchen appliances
- Whirlpool Duet ENERGY STAR rated front loading washer and dryer

### Interior Finishes and Paint
- Georgia Pacific Dens Armor Interior Walls
- Benjamin Moore Eco Spec Paint

### Energy Efficiency
- Philips Compact Fluorescent Dimmable Reflector Flood Lights
- Panasonic bath vents with CFL lights
- Lutron fan timers
- A&H Argon filled low-e windows
- Leviton occupancy sensors
- Velux low-e Argon filled skylight and Sun Tunnels

### Building Envelope
- Tyvek housewrap
- Grace Vycor window and door finishing
- Dow Great Stuff window and door sealant

### Plumbing Fixtures
- Kohler fixtures and fittings
- Sterling Rockton dual flush toilet
- Bosch Tankless Hot Water Heaters
- Metlund On Demand Hot Water Pumps

## Homeowner Viewpoint: Remodeling Your Own Home

When Doug Carr and his wife Donna decided to remodel their 1890 Queen Anne Victorian home, they chose to do it with green practices and products.

"We are interested in building quality for the long-term. We plan on living in the house for at least another ten to fifteen years and it made sense to me to invest in green products that would provide long-term benefits."

Like most of the research respondents, the idea that building green is the "right thing to do" also resonated with the Carr family as did the trade-offs between up-front costs and long-term benefits.

For example, when they selected their new dishwasher, they chose a more expensive Bosch unit because, "it was important to me to have quality appliances that used very little energy and water. It cost more up front, but it will save me on water costs, which are substantial in the Boston area."

Carr, an architect by training and profession, found his information about green building products the same way as our average respondent–by using the internet. "The Internet has made researching and finding products so much easier than ever."

Carr invested in adding 16 photovoltaic (PV) panels to his home. It was the most significant investment they chose to make, but it was one that they are most satisfied with. "Since installing the solar PV panels, our electric bills have been cut in half. My house is a small power plant, and I am making money off it. The system averages about 9 kW/day, and we use about half that and sell the rest back. This has a liberating effect: I don't care about the cost of electricity anymore."

*The Carrs live in a Queen Anne Victorian home in Medford, Massachusetts, which was originally built in 1890.*

# Resources and Partners

## Organizations, Web sites and publications that can help you get smarter about green homes

### McGraw-Hill Construction

- Main Website: **www.construction.com**
- *GreenSource:* **www.greensourcemag.com**
- Research & Analytics: **www.analytics.construction.com**
- *Architectural Record*: **www.archrecord.com**
- *Engineering News-Record*: **www.enr.com**
- Green Reports: **www.greensource.construction.com/resources/smartMarket.asp**

### National Association of Home Builders (NAHB)

- Main Website: www.nahb.org
- NAHB Model Green Home Building Guidelines: www.nahbrc.org/greenguidelines
- NAHB Research Center: www.nahbrc.org

## Other Resources for Green Home Information (listed alphabetically by category)

### Federal Government

- U.S. Environmental Protection Agency:
  - Main website: www.epa.gov
  - Energy Star: www.energystar.gov
- U.S. Department of Energy
  - Main Website: www.energy.gov
  - Office of Energy Efficiency and Renewable Energy: www.eere.energy.gov
  - Building America Program: www.buildingamerica.gov
  - National Renewable Energy Lab: www.nrel.gov
- U.S. Department of Housing and Urban Development: www.hud.gov

### Nonprofit Organizations

- Alliance to Save Energy: www.ase.org
- American Council for an Energy-Efficient Economy: www.aceee.org
- American Institute of Architects (AIA): www.aia.org
- Global Green USA: www.globalgreen.org
- Green Building Initiative: www.thegbi.org
- The Partnership for Advancing Technology in Housing (PATH): www.pathnet.org
- Southface Energy Institute: www.southface.org
- Sustainable Buildings Industry Council (SBIC): www.sbicouncil.org
- U.S. Conference of Mayors: www.mayors.org
- U.S. Green Building Council: www.usgbc.org

### Other

- Building Green, Inc.: www.buildinggreen.com
- Green Builder Magazine: www.greenbuildermag.com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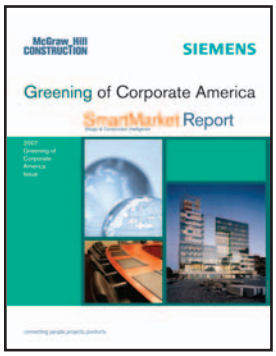




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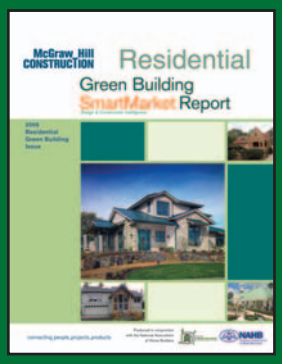




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