

# Green Multifamily and Single Family Homes 2017



PREMIER PARTNER

Sustainability & Green Building



RESEARCH PARTNER



# Introduction

## ABOUT THIS SMARTMARKET BRIEF

Since 2006, Dodge Data & Analytics and the National Association of Home Builders have teamed up to survey home builders about the level of their green building activity, the costs and benefits of building green, the drivers and obstacles influencing their decision to build green, and the green practices and features that they most widely use and value. More recent surveys have also included data on renewable energy and net zero homes and data from multifamily builders.

The current study demonstrates that a high percentage of single and multifamily builders and remodelers are engaged in green building and even more expect that involvement to grow. It also reveals lively growth in the use of renewable technologies, which is helping to drive more construction of net zero homes by builders.

The increased maturation in the green residential market is also evident in the reduced influence of obstacles that previously hampered the market, and in the moderate influence of a range of drivers encouraging builders to build green.

All findings suggest that residential green building is a strong market with vigorous growth expected in the future.

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## COVER IMAGE

*Urban NW Homes built the home featured on the cover of this report in the greater Portland, Oregon area as part of the Wild Glen community. It is NGBS Certified Emerald, and it is a net zero home because it was designed to use only as much energy as it can produce from PV panels located on the roof. The current tenants pay no utility bills and, furthermore, receive a check for over two thousand dollars per year through net metering.*

# Green Building Market Activity

## LEVEL OF NEW GREEN HOME BUILDING ACTIVITY SINGLE FAMILY HOME BUILDERS

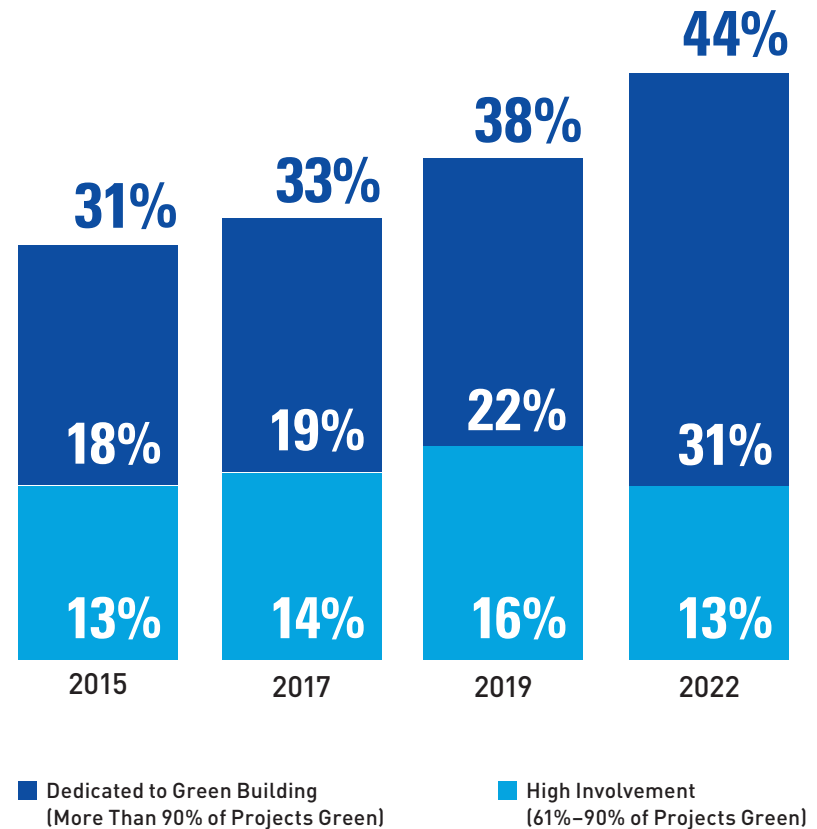
The trend toward building more green homes that has been consistently observed in our studies since 2006 is still evident in the current findings. One third (33%) of single family home builders currently build a majority of their homes green, a slight increase from the previous study in 2015. Over half of them (58%) are dedicated green builders, doing more than 90% of their projects green.

As they have in all the previous studies, home builders have high expectations about growth in the number of green homes they expect to build in the next five years. Most of the growth anticipated is among those who expect to be dedicated green builders (i.e., doing more than 90% of their projects green). By 2022, that percentage grows from 19% to 31%, nearly one third of all single family builders surveyed.

**SIZE OF COMPANY:** 24% of small builders (those doing less than 10 homes annually) are currently dedicated green builders, compared with 12% of large builders (doing 25 or more homes annually). However, by 2022, the percentage of small builders (32%) and large builders (31%) expected to be dedicated to green is roughly the same, suggesting that overall market growth in green homes is likely to continue to increase as they become more mainstream.

## Single Family Builders With High Level of Involvement in Green Building

Percentage doing more than 60% and more than 90% of their new homes green



# Green Building Market Activity

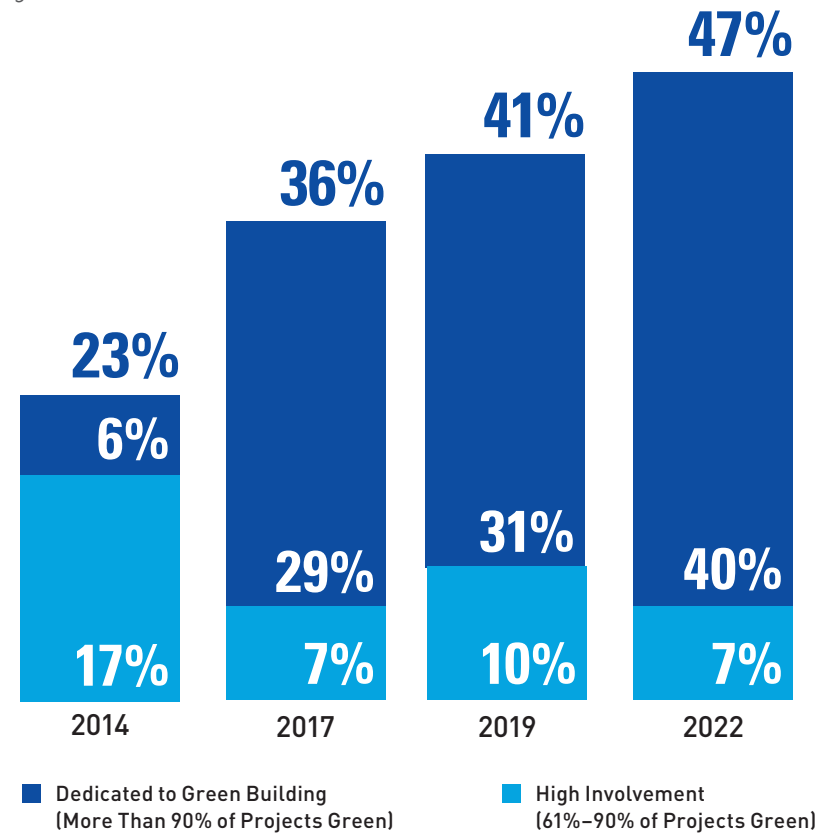
## LEVEL OF NEW GREEN HOME BUILDING ACTIVITY MULTIFAMILY BUILDERS

The percentage of multifamily builders doing more than 60% of their projects green increased dramatically from the study published in 2014 (the most recent Dodge study of multifamily green building) from 23% to 36%. This growth suggests that multifamily builders' experience with green building increased dramatically through the recent boom in that sector. That high level growth is expected to continue through 2022, with nearly half (47%) of multifamily builders expecting to be doing the majority of their projects green.

Even more encouraging is the growth among builders dedicated to green building (i.e. doing more than 90% green projects). By 2022, the percentage who expect to be building green at that level increases dramatically from just 29% in 2017 to 40% in 2022.

## Multifamily Builders With High Level of Involvement in Green Building

*Percentage doing more than 60% and more than 90% of their new homes green*



# Green Building Market Activity

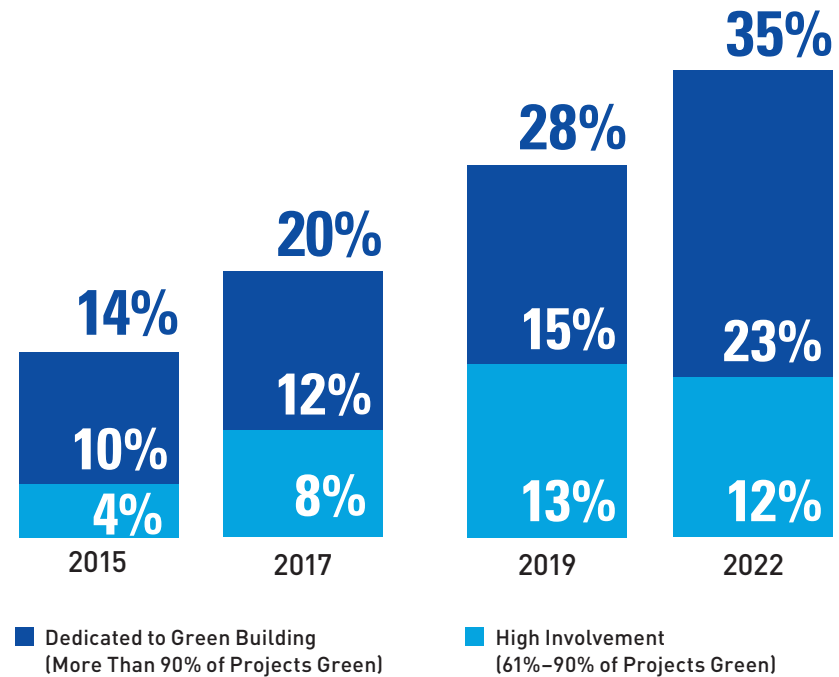
## LEVEL OF REMODELING GREEN BUILDING ACTIVITY

In 2015, only 14% of remodelers reported that most (over 60%) of their projects were green. The percentage with high involvement rose sharply to 20% in 2017 and increases to 35% by 2022. As with single family home builders and multifamily builders, the highest percentage of these builders falls in the dedicated green builder category (more than 90% of their projects are green).

The lower percentage of remodelers doing green when compared with builders of new projects is consistent with previous studies, and is likely influenced by the degree to which the scope of work in remodeling is client-driven. Another factor driving lower involvement with green may be the scope of work of many remodeling projects, which may just be confined to one or two trades and therefore not fully qualified to be considered a green project by the definition used in this study (see page 36 for the definition of green that builders and remodelers were asked to consider before answering these questions).

## Single Family Remodelers With High Level of Involvement in Green Building

*Percentage doing more than 60% and more than 90% of their new homes green*



# Green Building Market Activity

## COST OF BUILDING A GREEN HOME

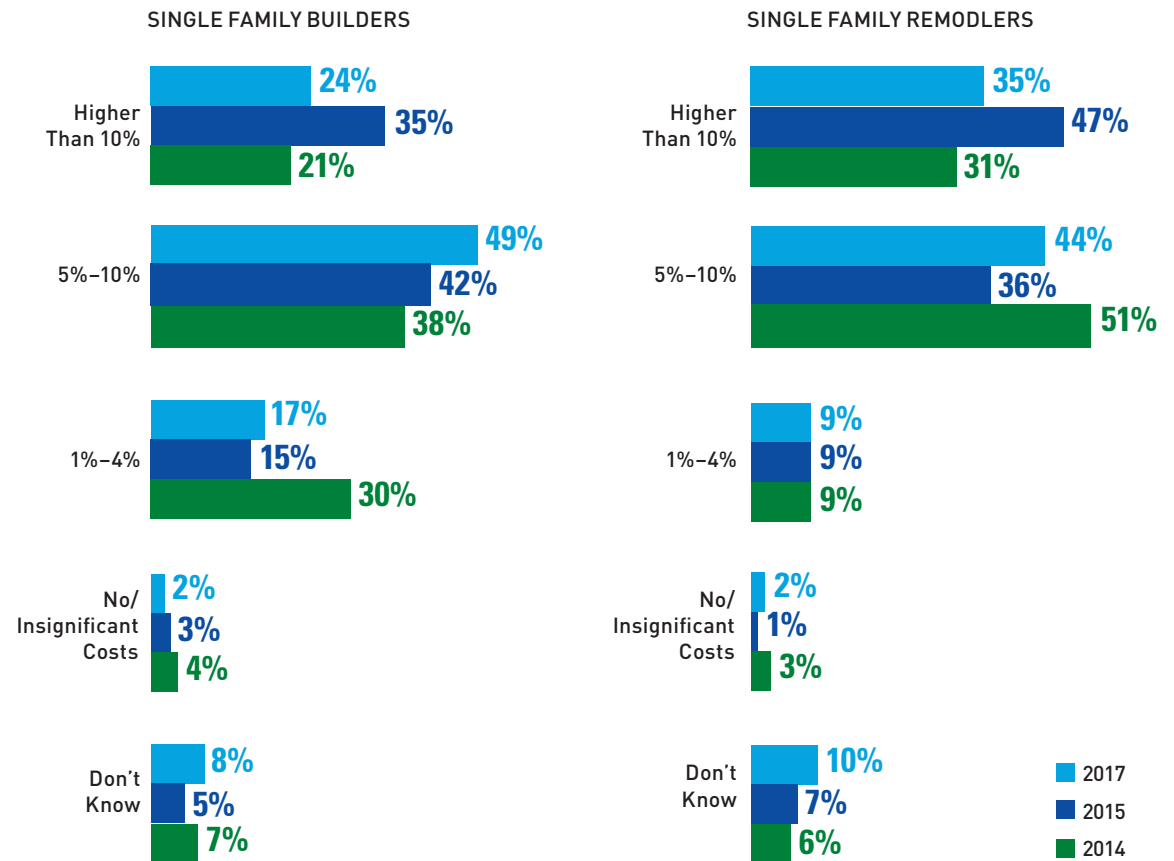
### SINGLE FAMILY BUILDERS AND REMODELERS

Builders and remodelers were asked about the cost of building green in the 2014, 2015 and 2017 studies, and, consistently, single family builders and remodelers have agreed that building green costs more than traditional home construction. However, the dramatic concern about higher costs reported in 2015 have subsided in 2017, with double-digit percentage point drops for those who believe that green building costs increase overall construction cost in excess of 10% or more.

The most common perception of builders and remodelers is that building green tends to cost between 5% and 10% more, although more than one third of remodelers report costs higher than 10%, compared with less than one quarter of builders.

**LEVEL OF GREEN BUILDING ENGAGEMENT:** 30% of single family builders and remodelers doing the majority (60% or more) of their projects green report lower incremental costs, compared with only half as many (15%) builders with less green involvement who cite that minor level of cost impact. This finding is consistent with previous studies and continues to suggest that experience with green building leads to lower costs.

## Single Family Builders and Remodelers' Perceptions of Incremental Cost of Green Features and Practices



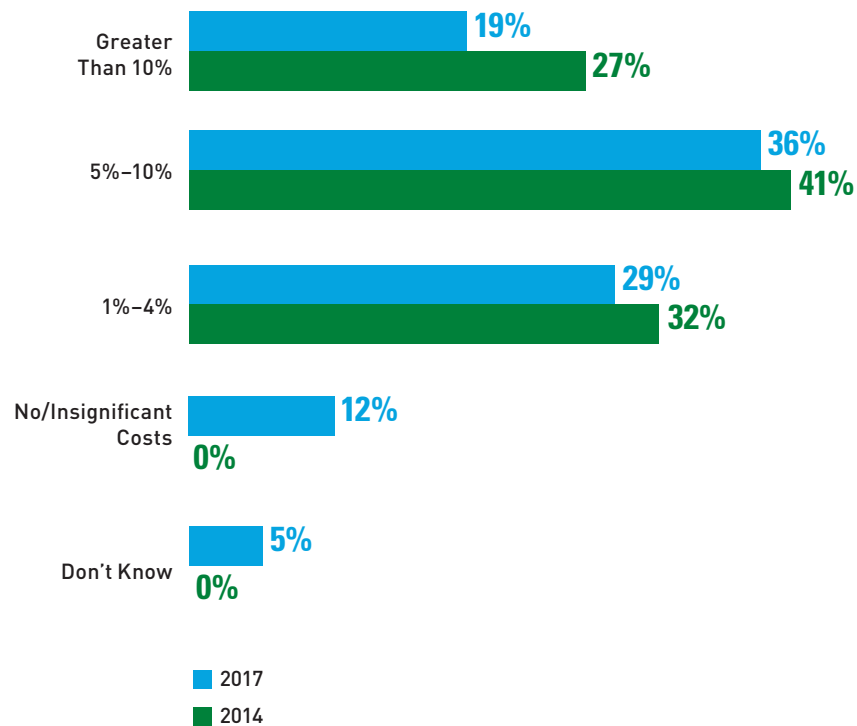
# Green Building Market Activity

## COST OF BUILDING A GREEN HOME MULTIFAMILY BUILDERS AND REMODELERS

The majority of multifamily builders and remodelers also find an incremental cost to building green, but the costs they report have declined dramatically since 2014. In particular, there is a decline of 8 percentage points between those who found costs of 10% or higher in 2014 and the current respondents. And even though the percentage who report no additional costs is relatively small (12%), it is a major increase from 2014, when no builders reported this.

This decline is likely due to greater experience with green building in the multifamily market, with a much higher percentage now building the majority of their projects green than were doing so in 2014 [see page 3].

## Multifamily Builders and Remodelers' Perceptions of Incremental Cost of Green Features and Practices



# Green Residential Building Market

## WILLINGNESS OF CUSTOMERS TO PAY FOR GREEN HOMES

All respondents were asked whether their customers would pay more for green homes. The chart at right shows just the percentage of those who believe they will and those who believe they won't. The remainder don't know whether their customers will or will not pay.

### SINGLE FAMILY BUILDERS

Most single family builders (71%) believe their customers will pay more for green homes, a finding that is consistent with that of 2014. On the other hand, a 5 percentage point bump has occurred between 2014 and 2017 in those who believe customers will not pay more for green.

This slight increase may correspond to findings from a qualitative study of home buyers published in the *2016 Green and Healthier Homes SmartMarket Report* that suggested that home buyers expect new homes in general to perform well on energy efficiency, which may lead them to be less willing to pay for green.

**GREEN INVOLVEMENT:** 91% of dedicated green builders find that their customers are willing to pay more for green homes.

### SINGLE FAMILY REMODELERS

While two thirds (66%) of single family remodelers believe that their customers will pay more for green, this is notably lower than the 79% who believed that in 2014. This may in part be due to the consistently low energy prices of the past few years, which may have reduced interest in improved home performance.

### MULTIFAMILY BUILDERS

More than half of multifamily builders believe their customers will pay more for green, but like the remodelers, the percentage has dropped compared with the 2014 study. In addition, the percentage of multifamily builders in 2017 who believe that their customers will not pay for green homes has increased, similar to the home builders.

## Willingness of Customers to Pay More for Green Homes According to Builders

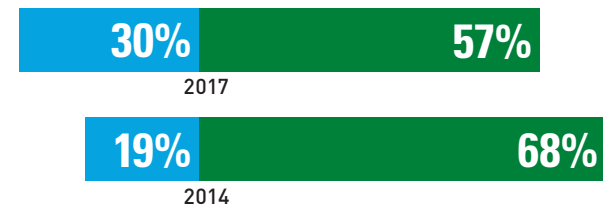
### Single Family Builders



### Single Family Remodelers



### Multifamily Builders



■ Won't Pay More ■ Will Pay More



# Green Building Market Activity

## ADDITIONAL AMOUNT RESPONDENTS BELIEVE CUSTOMERS ARE WILLING TO PAY

Builders and remodelers who indicated that customers are willing to pay more for green also identified the additional amount that they believe those customers will pay.

### SINGLE FAMILY BUILDERS

Over half (58%) of single family builders who believe their customers will pay more for green expect that they would pay between 1% and 4%. This is consistent with the findings reported in the 2014 SmartMarket Report.

The percentage who believe customers are willing to pay 10% or more for green in the current study (13%) is more than double the 5% who reported that in the 2014 report.

**GREEN INVOLVEMENT:** Nearly one quarter (24%) of dedicated green home builders (more than 90% green work) who believe that customers are willing

to pay more for green think that they will pay 10% or more.

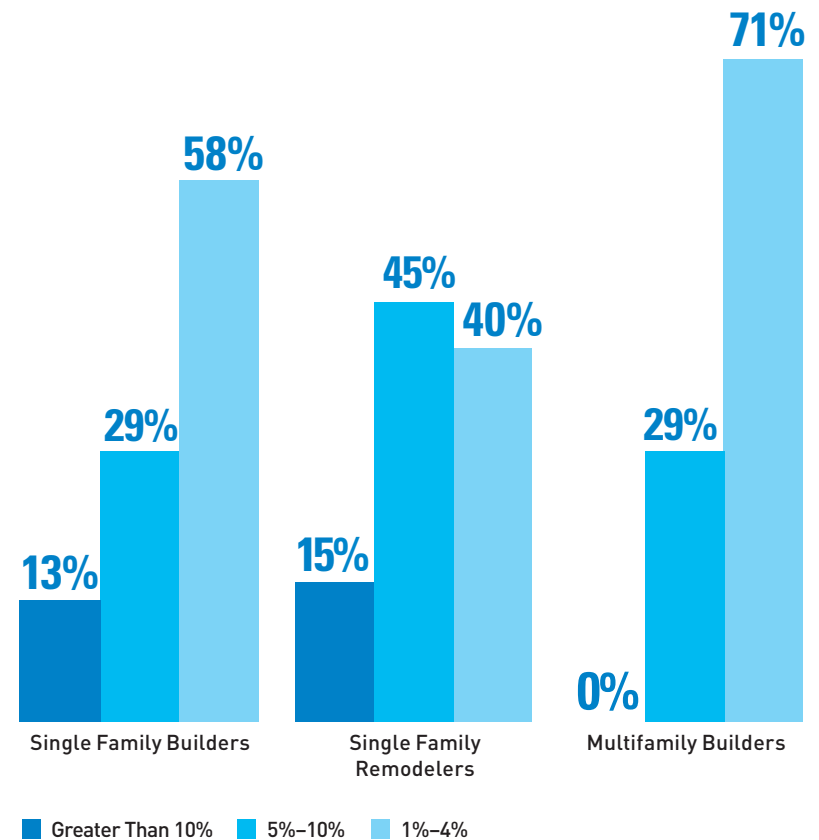
### SINGLE FAMILY REMODELERS

Almost half (45%) of single family remodelers who believe their customers will pay more for green think they will pay 5% to 10% more. Thus, even though single family builders are more optimistic about customer willingness to pay more for green (see page 7), remodelers expect a bigger percentage increase when paid more.

### MULTIFAMILY BUILDERS

In addition to being the most conservative about whether their customers will pay more for green homes, multifamily builders are also the most conservative about how much their customers are willing to pay, with nearly three quarters (71%) believing that the market will only accept 1% to 4% of additional cost.

## Additional Amount Customers Are Willing to Pay for a Green Home



# Marketing Green Homes

## EASE OF MARKETING GREEN HOMES

Single family and multifamily builders were asked about whether green homes are easier, more difficult or about the same to market as traditional homes. The chart at upper right shows those who find them easier and more difficult.

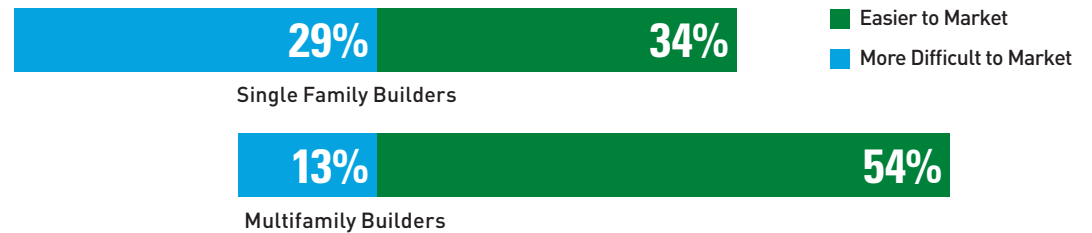
Over half (54%) of multifamily builders find green homes easier to market than traditional ones. In contrast, single family builders are nearly equally split between those who find them easier to market, those who find them the same and those who find them more difficult.

The findings for single family builders contrasts sharply with the findings from 2014, as can be seen in the chart on the lower right. While still emerging from the recession, green was a distinguishing feature in a challenging market. Now that the new residential home market has recovered, and expectations about the energy performance of new homes have become higher, the advantages of other aspects of a green home, such as improved indoor environmental quality, may need to be emphasized in marketing efforts.

**GREEN INVOLVEMENT:** Green experience appears to help with its marketing. Nearly half (42%) of those building a majority of homes green and over half (55%) of dedicated green builders find that green homes easier to market, a finding that is also consistent with previous studies.

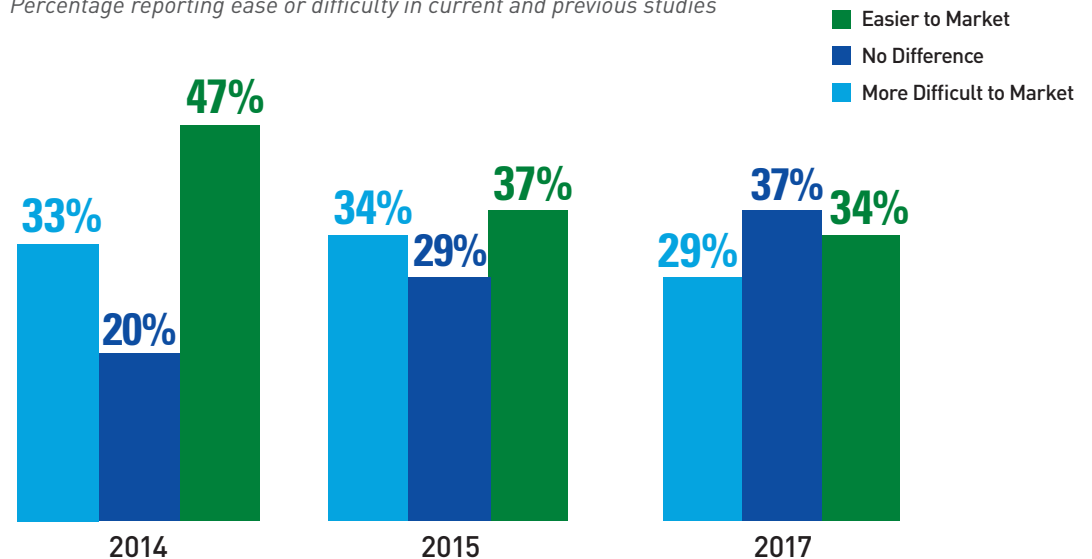
## Ease of Marketing New Green Homes

Percentage of those who find green homes easier or more difficult to market



## Ease of Marketing Green Homes for Single Family Home Builders

Percentage reporting ease or difficulty in current and previous studies



# Marketing Green Homes

## COMMUNICATING ABOUT GREEN HOMES

As the previous findings suggest, simply being green is not sufficient for effective marketing. Single family and multifamily home builders need to consider which terms resonate most with consumers when marketing their green homes.

In the survey, single family and multifamily builders and remodelers were asked about the most effective terminology for communicating with their customers about green. Their responses suggest that cost savings and improved health resonate best with their customers.

- Referencing cost savings is most widely recognized among both single and multifamily builders as effective.
- Operating efficiency is also an effective phrase for multifamily customers, and, to a slightly lesser degree, single family home buyers/owners.
- Healthier homes is recognized by nearly half as an effective phrase.
- Quality construction, being high performance and durability are all considered effective by a much higher percentage of single family builders than multifamily builders.
- Reduced environmental impact is rated as effective by a higher percentage of multifamily builders than single family builders, but even that percentage (15%) is still relatively low.

## Effectiveness of Terminology Used to Market Green Homes

*Percentage who consider terminology effective by type of builder*

Most Effective Terms		
Long-Term Utility Cost Savings	62%	58%
Operating Efficiency	46%	54%
Fairly Effective Terms		
Healthier Homes	44%	44%
Quality Construction	42%	29%
High Performance	39%	27%
Least Effective Terms		
Durable Construction	20%	6%
Sustainable	15%	8%

■ Single Family Builders and Remodelers    ■ Multifamily Builders and Remodelers

# Drivers and Obstacles for Green Homes

## DRIVERS FOR FUTURE GREEN HOME CONSTRUCTION AND REMODELING

### SINGLE FAMILY BUILDERS AND REMODELERS

Single family builders and remodelers were asked to rate the impact of different factors on their decision to build green in the future, a question asked in the previous studies conducted in 2014 and 2015 as well.

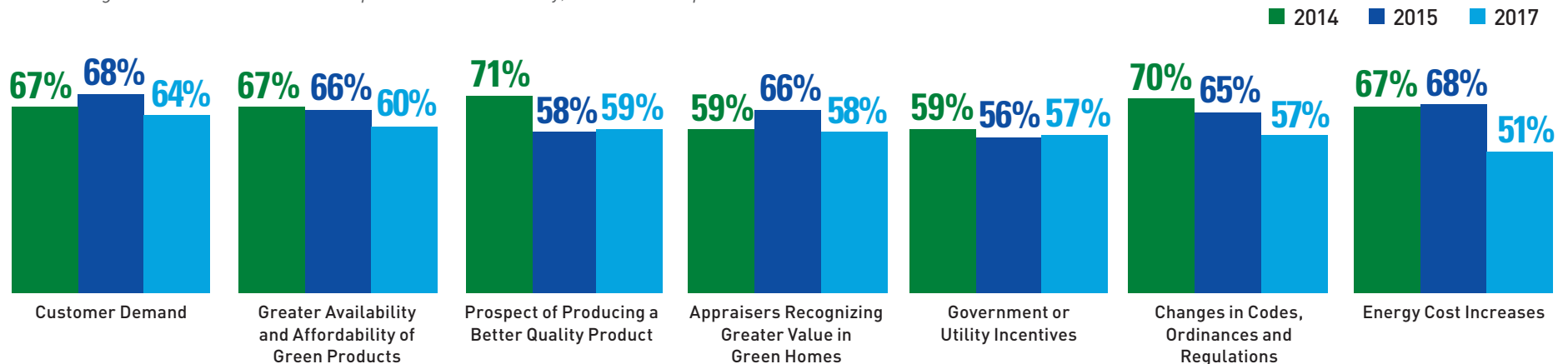
In 2014, two factors—prospect of producing a better quality product and changes in codes, ordinances and regulations—were selected by 70% or more of respondents. However, in 2015 and currently, fewer individual drivers are widely recognized as influential. Therefore, even though customer demand is the driver most frequently

rated as important, the gap between it and the one rated lowest, energy cost increases, is only 13 percentage points.

This finding reveals that no single factor drives the green residential market. However, the influence of individual drivers has largely remained consistent. In most cases, the individual percentages are only a few percentage points different from those in 2014, with three exceptions: producing a better quality product, changes in codes, ordinances and regulations, and energy cost increases all dropped notably in 2017 compared with 2014. *(continued on next page)*

### Single Family Builders and Remodelers' Drivers for Future Green Building/Remodeling

Percentage who rated each driver as important in current study, and in studies published in 2015 and 2014



# Drivers and Obstacles for Green Homes

## DRIVERS FOR FUTURE GREEN HOME CONSTRUCTION AND REMODELING

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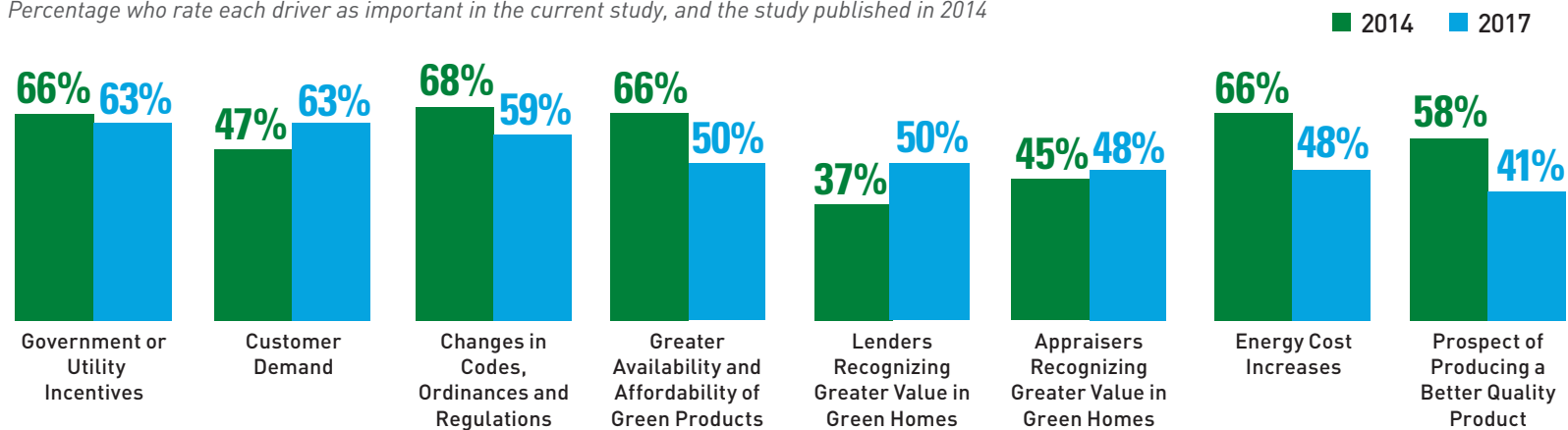
**GREEN INVOLVEMENT:** A higher percentage of single family builders doing a majority of green projects (between 60% to 90% of their projects green) find that the prospect of producing a better quality product (88%), customer demand (76%) and appraisers recognizing the value of green homes (73%) are highly influential drivers than the percentage of those doing less than 15% green projects (46%, 59% and 53%, respectively). Those dedicated to green (more than 90% green projects) tend to report lower percentages for most drivers than these majority green builders, but that is probably because at that level, they no longer need additional drivers to build green.

### MULTIFAMILY BUILDERS AND REMODELERS

Multifamily builders and remodelers were asked to rate the same factors as single family firms, but their responses differ. The gap between the factor rated important by the highest percentage of multifamily respondents (government or utility incentives) and the lowest (prospect of producing a better quality product) is 22 percentage points. In addition, the percentages who consider several drivers important in 2017 among multifamily builders have shifted notably since 2014. Customer demand and *(continued on next page)*

### Multifamily Builders and Remodelers' Drivers for Future Green Building/Remodeling

Percentage who rate each driver as important in the current study, and the study published in 2014



# Drivers and Obstacles for Green Homes

## DRIVERS FOR FUTURE GREEN HOME CONSTRUCTION AND REMODELING

*(continued from previous page)*

lenders recognizing greater value in green homes are considered important by a much higher percentage than did so in 2014, while the importance of greater availability and affordability of green products, energy cost increases and the prospect of producing a better quality product have each declined.

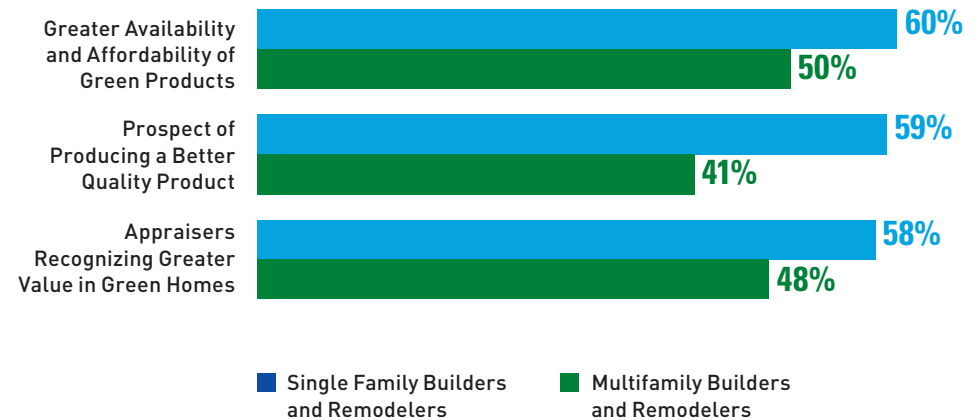
### GREATEST DIFFERENCES BETWEEN SINGLE FAMILY AND MULTIFAMILY RESPONDENTS

For the most part, similar percentages of single family and multifamily respondents rate each of these potential drivers as important, with three notable exceptions. A much higher percentage of single family builders and remodelers consider the following to be important than multifamily firms: the greater availability and affordability of green products; the prospect of producing a better quality product; and the influence of appraisers recognizing the value of green homes.

The association of green with higher quality and the influence of appraisers were also bigger drivers among single family builders/remodelers than among those doing multifamily projects in 2014. However, the gap between single family and multifamily respondents around the influence of green product availability and affordability is new and surprising. It could be at least partly due to greater experience with green building among the single family builders, which would lead to greater knowledge about green products.

## Drivers for Future Green Building With Greatest Difference Between Single Family and Multifamily Builders/Remodelers

*Percentage who rate each driver as important in the current study*



# Drivers and Obstacles for Green Homes

## OBSTACLES TO INCREASED GREEN BUILDING ACTIVITY

### SINGLE FAMILY BUILDERS AND REMODELERS

Single family builders and remodelers were asked to rate the impact of different potential obstacles to increasing their green building activity. The chart below shows the percentage who rate each obstacle as high/very high in the current study, compared with the two previous studies.

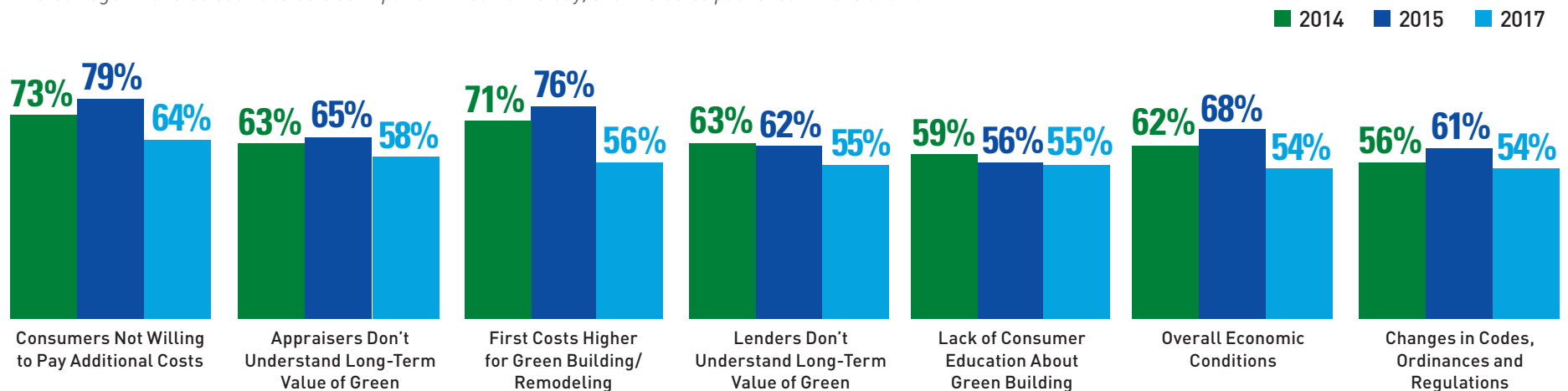
Every obstacle has a lower percentage who consider it impactful than in the last two studies. While in most cases, the declines are within the margin of error, the overall pattern is still notable. There are also a few obstacles that declined significantly: concerns that consumers are not willing to pay for green, higher first

costs (real or perceived), and overall economic conditions are considered major obstacles by a much lower percentage in the current study than the last two.

**GREEN INVOLVEMENT:** Only 49% of single family builders who do more than 60% green projects find that consumers not being willing to pay more for green is a major obstacle. The reduced level of concern among dedicated green builders about cost likely contributes to the overall decline in concern about this obstacle since 2014 because of the increase in the number of dedicated green builders during this period (see page 2). *(continued on next page)*

### Single Family Builders and Remodelers' Obstacles to Increased Green Building Activity

Percentage who rated each obstacle as important in current study, and in studies published in 2015 and 2014



# Drivers and Obstacles for Green Homes

## OBSTACLES TO INCREASED GREEN BUILDING ACTIVITY

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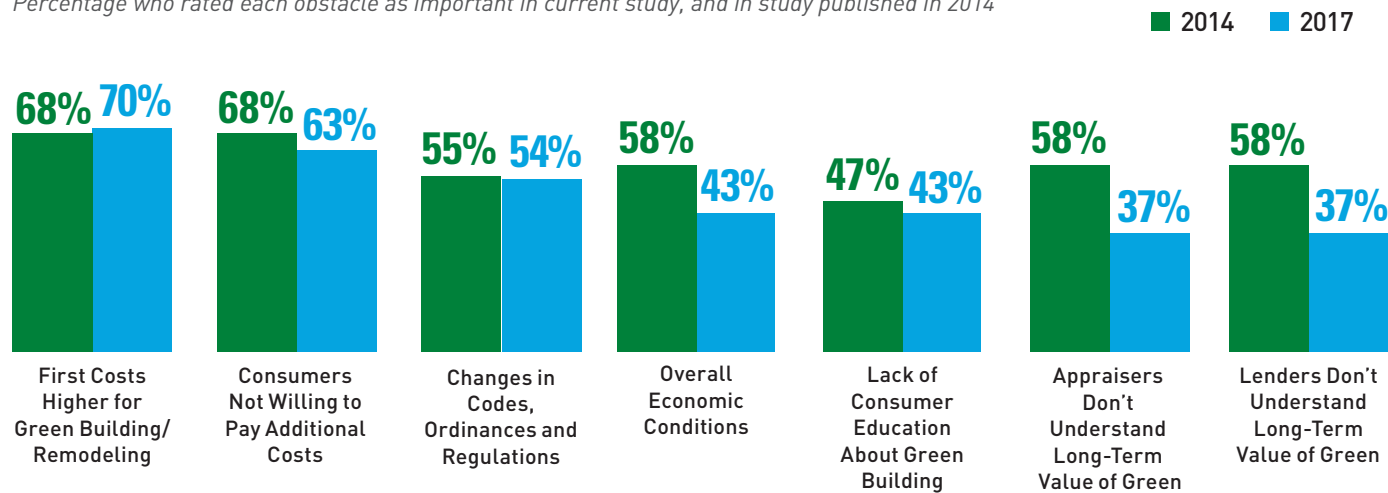
### MULTIFAMILY BUILDERS AND REMODELERS

Multifamily builders were asked to rate the same set of obstacles in the current study and in 2014. While many are still concerned about higher costs and lack of consumer willingness to pay more, six out of seven obstacles show a decline from 2014. In fact, the only obstacle rated important by a higher percentage in 2017 than in 2014 is the concern over higher first costs, although the increase is marginal.

On the other hand, a much lower percentage of multifamily builders now consider overall economic conditions, and the lack of understanding of the value of green by lenders or appraisers to be as significant obstacles to increased green building activity as they did in 2014. *(continued on next page)*

### Multifamily Builders and Remodelers' Obstacles to Increased Green Building Activity

Percentage who rated each obstacle as important in current study, and in study published in 2014





# Drivers and Obstacles for Green Homes

## OBSTACLES TO INCREASED GREEN BUILDING ACTIVITY

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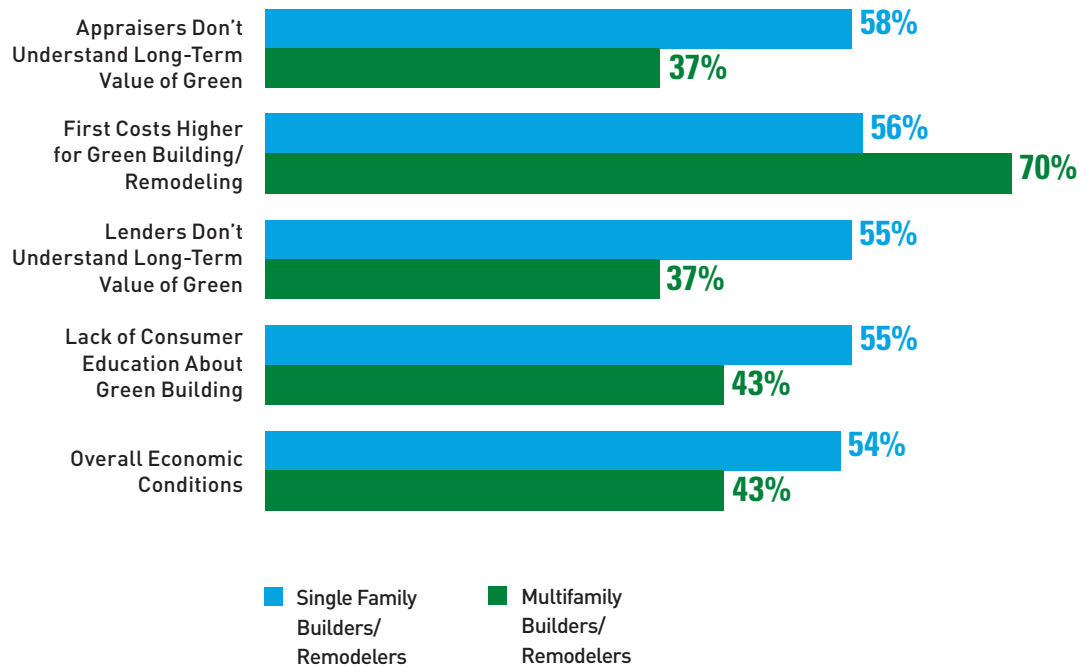
### GREATEST DIFFERENCES BETWEEN SINGLE FAMILY AND MULTIFAMILY RESPONDENTS

Multifamily builders are more concerned about costs and single family firms more concerned about factors that create consumer demand in the current study.

- Far more multifamily respondents (70%) consider higher first costs a major obstacle than single family builders (56%).
- On the other hand, single family respondents more frequently consider lack of understanding by appraisers and lenders of the value of green, lack of consumer education about green building and overall economic conditions to be major obstacles than do multifamily respondents.

### Obstacles to Increased Green Building Activity With the Greatest Difference in Response Between Single and Multifamily Builders and Remodelers

*Percentage who rate each obstacle as important in the current study*



# Green Building Practices and Features

## TOP PRACTICES FOR IMPROVING GREEN HOME PERFORMANCE

Respondents were asked to identify the top three practices for improving the performance of a green home. While being energy efficient is universally recognized as important, and healthy indoor living environments are also ranked frequently among their top three by single family and multifamily respondents alike, there are also notable differences in the importance they place on other practices.

### SINGLE FAMILY HOME BUILDERS AND REMODELERS

In every Dodge Data & Analytics study on green residential building for over a decade, nearly all single family builders and remodelers have ranked being energy efficient as a top factor for improving home performance, and the current study continues that pattern.

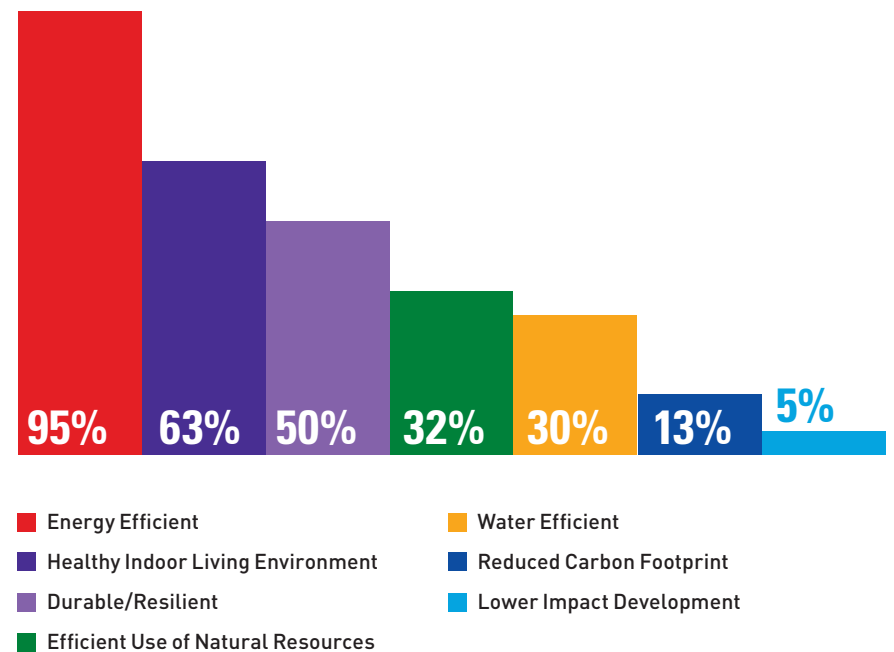
Healthy indoor living environment has the second highest percentage who rank it among their top three practices, 13 percentage points above homes being durable/resilient. This is in marked contrast to the previous study, where only one percentage point separated these factors, and is a shift away from the priority given to durability/resilience in previous studies.

In the 2014 study, water efficiency was considered important by just under half, but it dropped to one third in the last study and is now just under one third in the current study.

**GREEN INVOLVEMENT:** There are no statistically significant differences between builders based on green involvement for these practices, except for the high value placed on the efficient use of natural resources by those doing 15% or fewer of their projects green. Nearly half (49%) of them rank this among their top three practices, which is in sharp contrast to the dedicated green builders, only 15% of whom rank this practice highly.

## Single Family Builders and Remodelers' Top Practices for Improving Performance of a Green Home

*Percentage who select each as one of their top three practices*



# Green Building Practices and Features

## TOP PRACTICES FOR IMPROVING GREEN HOME PERFORMANCE MULTIFAMILY BUILDERS/REMODELERS

Water efficiency is recognized as a more important practice by multifamily respondents than by single family respondents. It is the third most frequently cited practice, just 4 percentage points below a healthy indoor living environment. This finding is consistent with the study published in the 2014 SmartMarket Report.

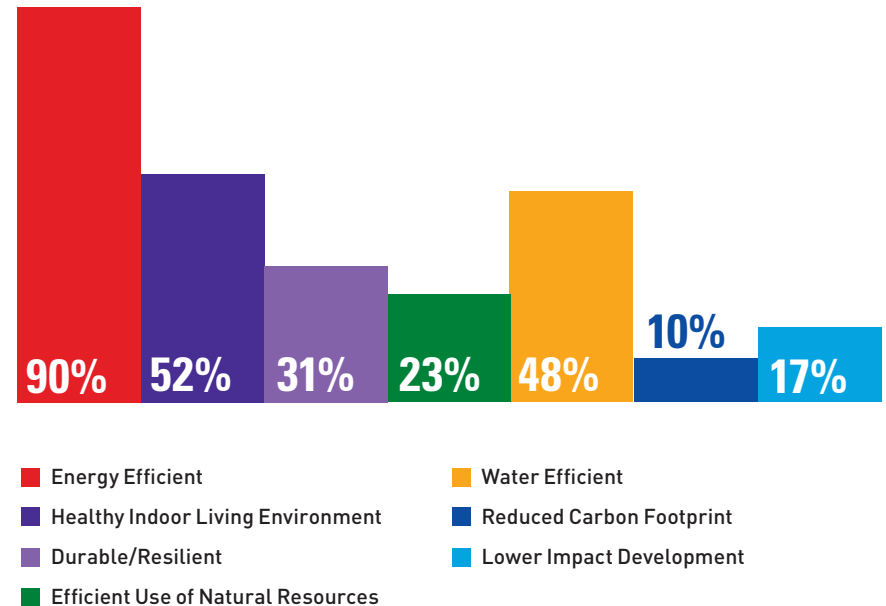
The green apartment market may be helping to drive the high priority given to water efficiency by multifamily builders. While inexpensive water in many parts of the US may prevent homeowners from seeing notable savings, landlords who pay for water may see more substantial savings from improved water efficiency across multiple units. Their interest in this area could influence the builders and remodelers to prioritize this factor.

While only 17% of multifamily respondents select lower impact development as one of their top three practices, this is still three times as many as the single family builders and remodelers who do.

Fewer multifamily than single family builders rank durability/resilience among their top three practices for improving green home performance, a finding that is also consistent with the previous study. This is likely the case because, while homeowners may regard their homes as long-term investments, larger multifamily projects are considered commercial real estate, with payback periods typically closer to a decade or less.

## Multifamily Builders and Remodelers' Top Practices for Improving Performance of a Green Home

Percentage who select each as one of their top three practices



# Green Building Practices and Features

## FEATURES THAT MAKE HOMES GREENER THAN THEY WERE TWO YEARS AGO

Single family and multifamily builders and remodelers were asked to select the building practices that make their current residential projects greener than the projects they built two years ago. The chart at right represents their combined responses since there were no significant differences between them.

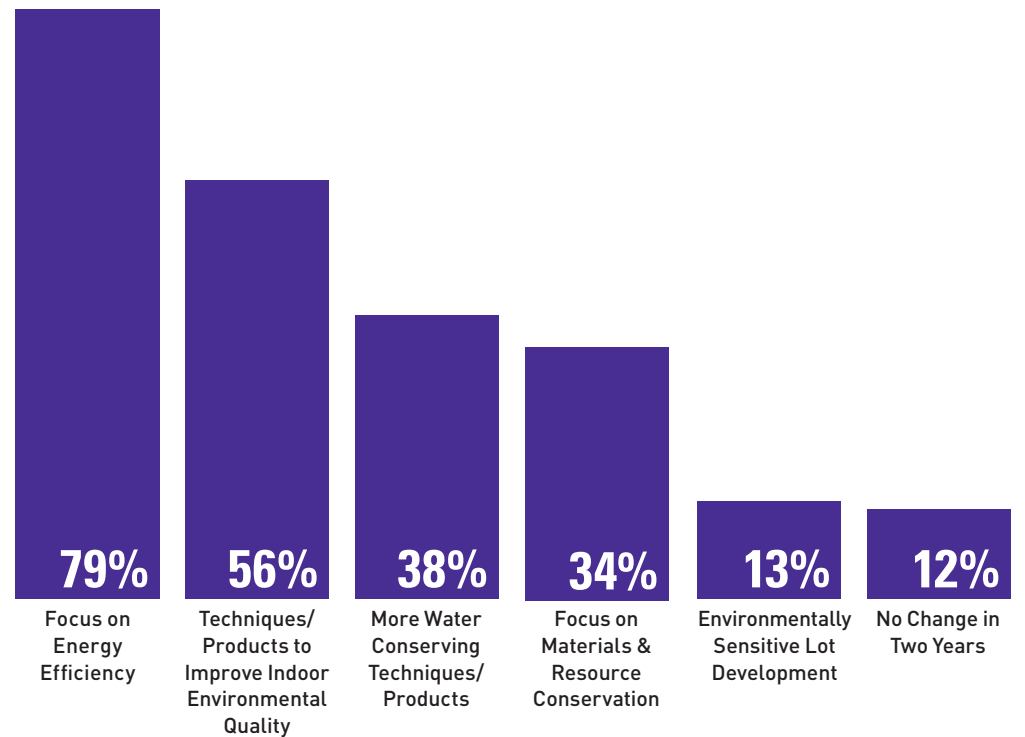
There appears to be widespread agreement that they are building greener homes now, with only 12% saying they saw no change over the previous two years. Interestingly, among single family builders, this is as true of respondents doing little or no green building as it is of those doing the majority of their projects green. In fact, the findings make clear that a greater focus on energy efficiency is becoming ubiquitous, whether a respondent identifies themselves as a green builder or not.

Other practices, such as water conservation and environmentally sensitive lot development, are selected by 38% or fewer as features that distinguish their projects from ones done two years ago.

**GREEN INVOLVEMENT:** Over two thirds (67%) of single family respondents doing more than 15% of their projects green make their current projects greener through techniques/products to improve indoor environmental quality. As more builders increase their level of green involvement (see pages 2-4), use of practices promoting improved indoor environmental quality should continue to grow.

## Features That Make Homes Greener Than They Were Two Years Ago

Percentage of single family and multifamily respondents selecting each



# Green Residential Building Practices and Features

## ENERGY-EFFICIENT PRACTICES AND FEATURES

More than 95% of single and multifamily respondents use energy-efficient practices involving HVAC and lighting systems, the use of efficient appliances and practices involving the walls and envelope. The remaining energy-efficient practices are also widely used.

### HVAC

More single family respondents using properly sized HVAC systems consider them important for green building compared with multifamily respondents using those systems. A smaller but still notable disparity also occurs in the value placed on highly efficient HVAC systems by those who use them.

**GREEN INVOLVEMENT:** Properly sized and highly efficient HVAC systems are rated as important by over 80% of those doing no green residential building, and by 100% of dedicated green builders.

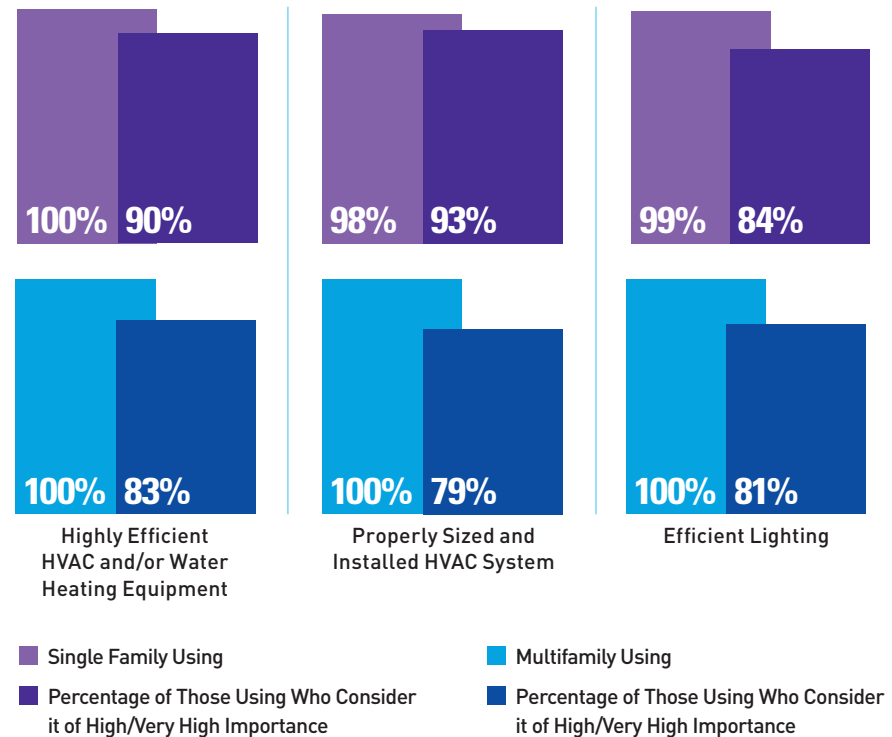
### LIGHTING

Single family and multifamily respondents agree on the importance of efficient lighting, with over 80% of those who use them also considering them important.

*(continued on next page)*

## Use and Importance of HVAC and Lighting Systems

Percentage currently using each practice, and among those users, the percentage who consider it important/very important to green building



# Green Residential Building Practices and Features

## ENERGY-EFFICIENT PRACTICES AND FEATURES

*(continued from previous page)*

### ENERGY-EFFICIENT APPLIANCES

Both lighting and appliances are widely used and highly valued among single family and multifamily respondents.

### BUILDING ENVELOPE

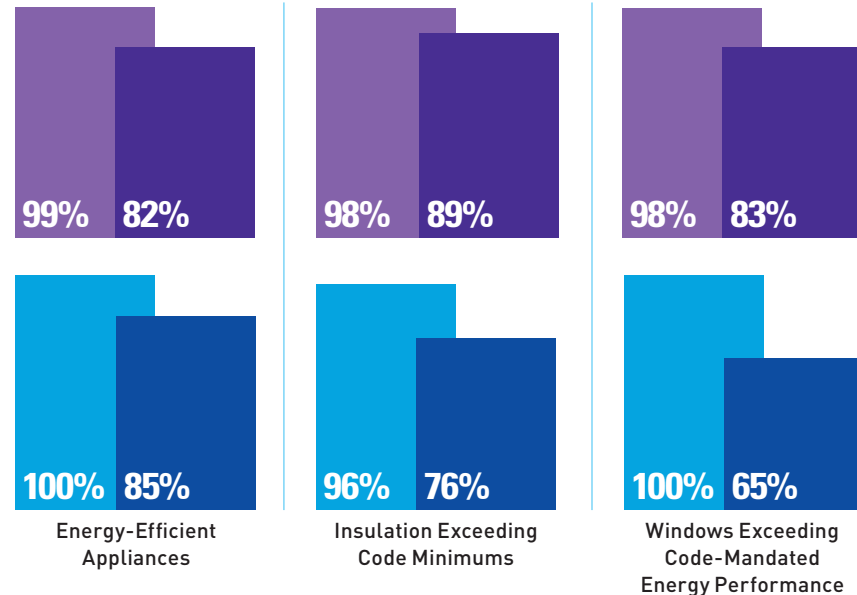
Among those using insulation or windows exceeding code mandates, a much higher percentage of single family builders consider them valuable than do multifamily builders. For windows, the gap is 18 percentage points.

**GREEN INVOLVEMENT:** The majority of single family respondents using insulation exceeding code mandates agree about its importance, regardless of their level of green involvement. However, while most of those using windows that exceed code mandates also consider them valuable, those doing the majority (60% or more) of their projects green universally rate this feature as important.

*(continued on next page)*

## Use and Importance of Appliances and Building Envelope Features

Percentage currently using each practice, and among those users, the percentage who consider it important/very important to green building



■ Single Family Using  
■ Percentage of Those Using Who Consider it of High/Very High Importance  
■ Multifamily Using  
■ Percentage of Those Using Who Consider it of High/Very High Importance

# Green Residential Building Practices and Features

## ENERGY-EFFICIENT PRACTICES AND FEATURES

*(continued from previous page)*

### PASSIVE SOLAR DESIGN

While passive solar design is used by about three quarters of single family and multifamily respondents, it is generally rated as important by a lower percentage of users than the other energy-efficient practices and features studied. This is especially true among multifamily builders, most of whom do not rate passive solar design highly.

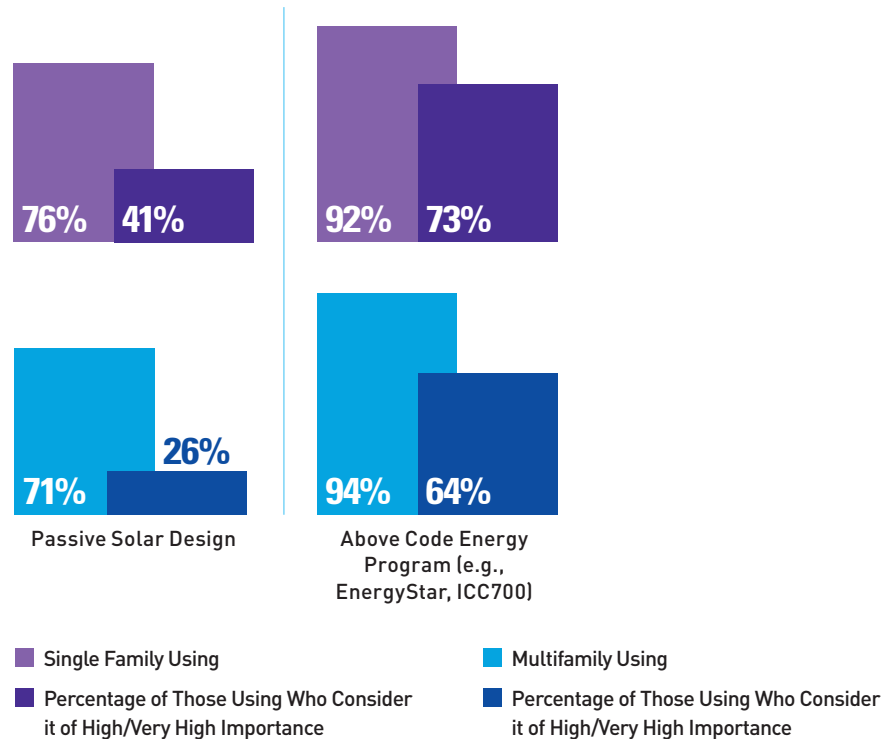
**GREEN INVOLVEMENT:** Over half of single family respondents doing more than 30% green projects and using passive solar design consider it important. This demonstrates that even limited green involvement is enough to reinforce the value of passive solar design.

### ENERGY PROGRAMS

Not only do more single family respondents using energy programs consider them important than multifamily builders, but the greater their involvement with green building is, the more likely single family respondents are to consider these important.

## Use and Importance of Passive Solar and Energy Programs

*Percentage currently using each practice, and among those users, the percentage who consider it important/very important to green building*



# Green Residential Building Practices and Features

## WATER-EFFICIENT PRACTICES AND FEATURES

### PLUMBING FIXTURES AND TECHNIQUES

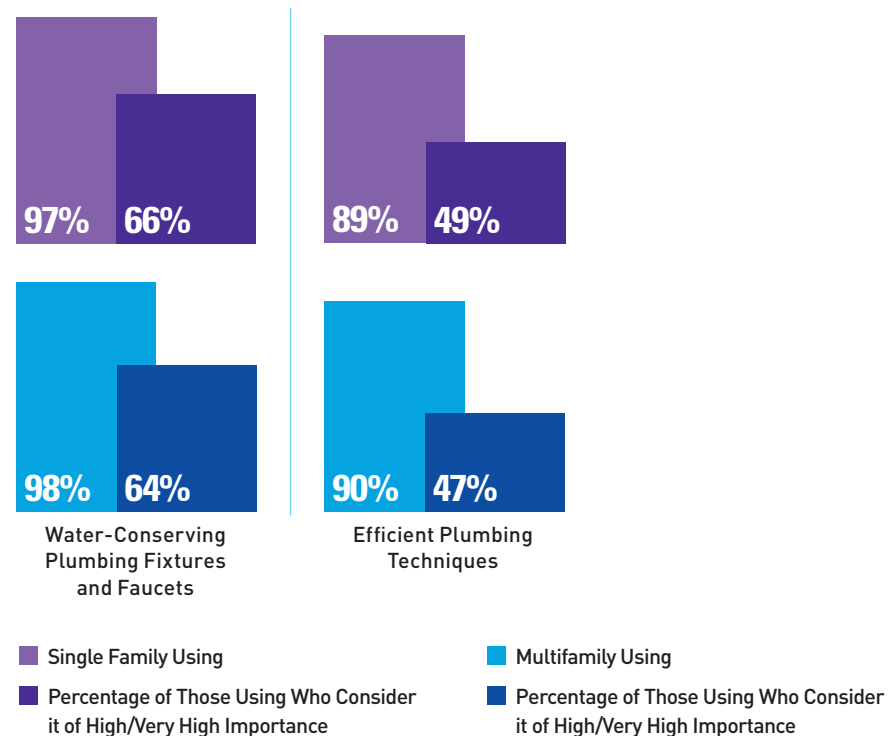
Water-efficient features are widely used by respondents, but perception of their importance varies, especially between single family and multifamily builders and remodelers.

Water-conserving plumbing fixtures and faucets are widely recognized as important green features, with around two thirds of both single and multifamily respondents regarding them as important. However, less than half of those using efficient plumbing techniques consider them of high importance.

**GREEN INVOLVEMENT:** There are no significant differences among those doing more or less green building in how they rate the importance of plumbing fixtures or efficient plumbing techniques.

### Use and Importance of Water-Conserving Plumbing Fixtures and Efficient Plumbing Techniques

Percentage currently using each practice, and among those users, the percentage who consider it important/very important to green building





# Green Residential Building Practices and Features

## WATER EFFICIENT PRACTICES AND FEATURES

### WATER -CONSERVING APPLIANCES

Nearly all single family builders (97%) and all multifamily builders use water-conserving appliances on at least some of their projects. These features are also regarded as relatively important, with about two thirds rating them as of high or very high importance.

**GREEN INVOLVEMENT:** There is no difference by level of green involvement in the importance attributed to water-conserving appliances.

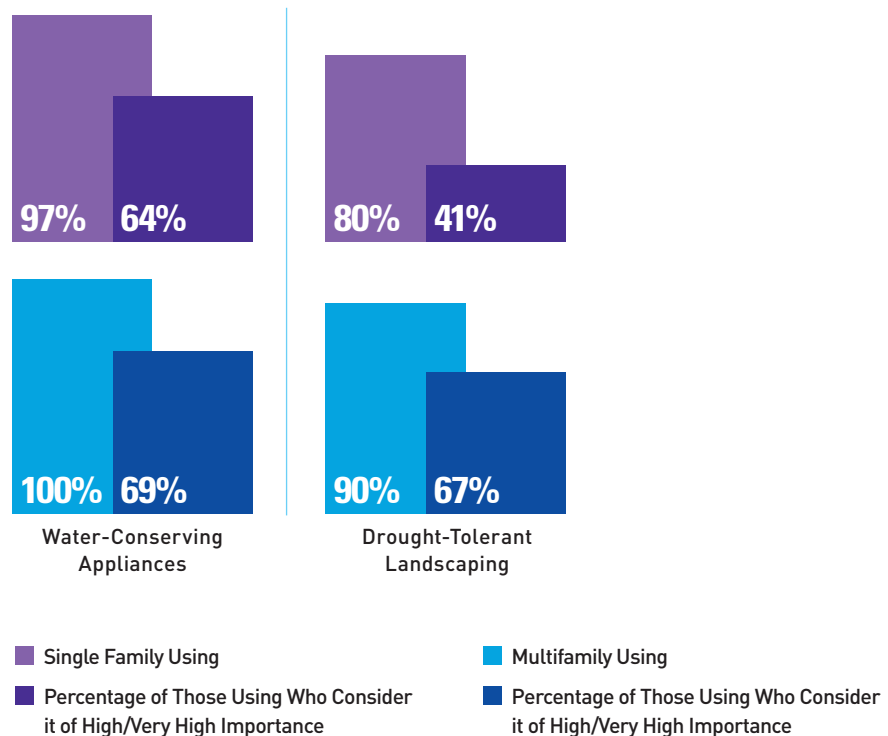
### DROUGHT-TOLERANT LANDSCAPING

Drought-tolerant landscaping is widely used by multifamily builders, with 90% reporting using it on at least some of their projects. It is slightly less common but still widely used among single family builders, with 80% reporting use of this feature.

However, among those who use this approach, more than two thirds (67%) of multifamily builders consider it of high importance, but less than half (41%) of single family builders do. Multifamily builders may be more attuned to owner costs for landscaping, a factor that is unlikely to be frequently mentioned to builders by single family owners. Also, multifamily builders may be trying to achieve green certification for marketing purposes, and landscaping may be a relatively inexpensive way to earn points in water categories of rating systems.

## Use and Importance of Water-Conserving Appliances and Drought-Tolerant Landscaping

*Percentage currently using each practice, and among those users, the percentage who consider it important/very important to green building*



# Green Residential Building Practices and Features

## IMPROVED INDOOR ENVIRONMENTAL QUALITY

The findings demonstrate widespread use of increased moisture control and ventilation, and low VOC materials on both single family and multifamily green home projects. However, both single family and multifamily respondents tend to rate the importance of increased moisture control highly more often than they do low VOC materials. This is particularly true of single family builders and remodelers, where there is a 22-point gap in the percentage of users who consider each important.

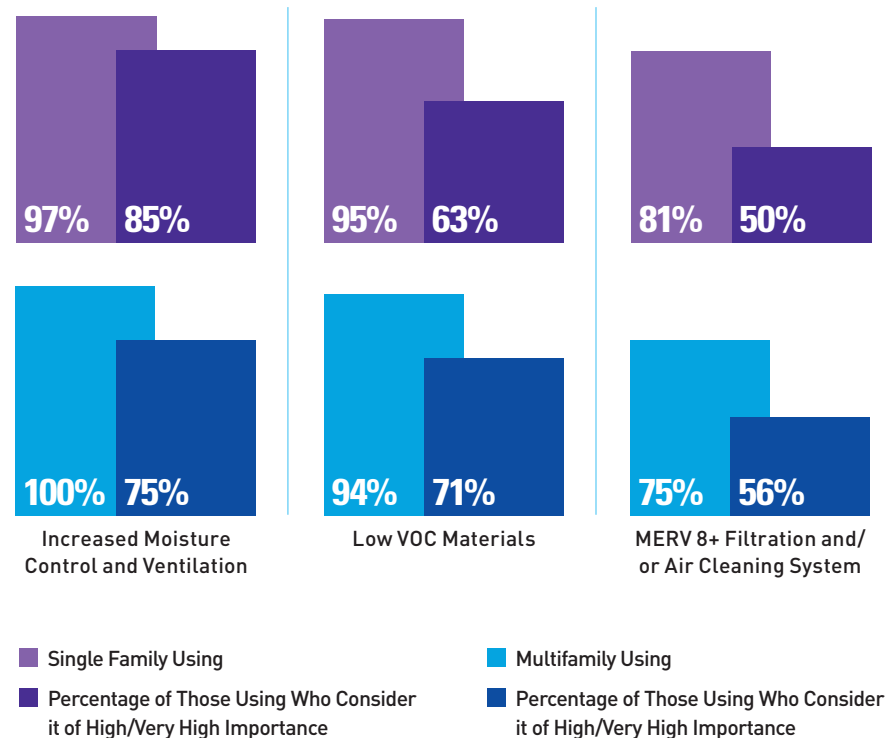
Single family home builders may not find as much awareness and interest among their customers of the importance of using materials with low/no VOCs as multifamily builders do.

Most builders and remodelers have used MERV 8+ filtration and/or air cleaning systems on their projects, but only half of those using them rate them as highly important.

**GREEN INVOLVEMENT:** Familiarity with green leads to greater understanding of the importance of MERV 8+ filtration and air cleaning systems. 60% of single family builders doing the majority of their projects green rate them as highly important, compared with only 23% of those doing no green homes.

## Use and Importance of Practices and Features That Improve Indoor Environmental Quality

Percentage currently using each practice, and among those users, the percentage who consider it important/very important to green building



# Green Residential Building Practices and Features

## MATERIALS AND RESOURCE CONSERVATION DURABLE, RECLAIMED AND RECYCLABLE MATERIALS AND BUILDING PRODUCTS

Among single family builders and remodelers, durable materials are both widely used and highly valued. While the majority also use recyclable/rapidly renewable building materials or reclaimed building products, these are not as widely valued, with only about one third to one quarter of those using them considering them to be of high/very high importance.

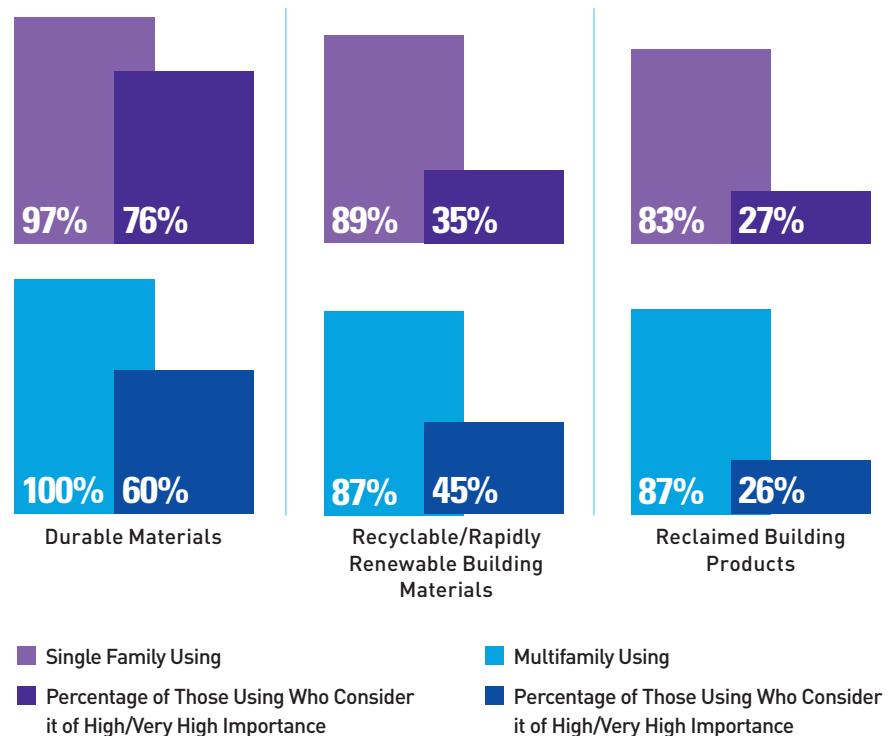
Despite their wide use of durable materials, the percentage of multifamily users who find durable materials to be highly important is 16 points less than the single family home builders. However, multifamily respondents do place more value on durable materials than on most of the other practices and features in the materials and resource conservation category.

A high percentage of multifamily builders use recyclable/rapidly renewable building materials, and more multifamily users find them valuable than single family ones. However, even among multifamily builders, the value placed on them does not seem to correspond to their widespread use. This disparity between use and value is also evident for reclaimed building products.

*(continued on next page)*

## Use and Importance of Durable, Reclaimed and Recyclable Materials and Building Products

*Percentage currently using each practice, and among those users, the percentage who consider it important/very important to green building*



# Green Residential Building Practices and Features

## MATERIALS AND RESOURCE CONSERVATION

*(continued from previous page)*

### CERTIFIED SUSTAINABLY HARVESTED LUMBER

While over 80% of single family and multifamily respondents report using certified sustainably harvested lumber on at least some of their projects, very few rate this feature as highly important.

### REDUCTION OF CONSTRUCTION WASTE

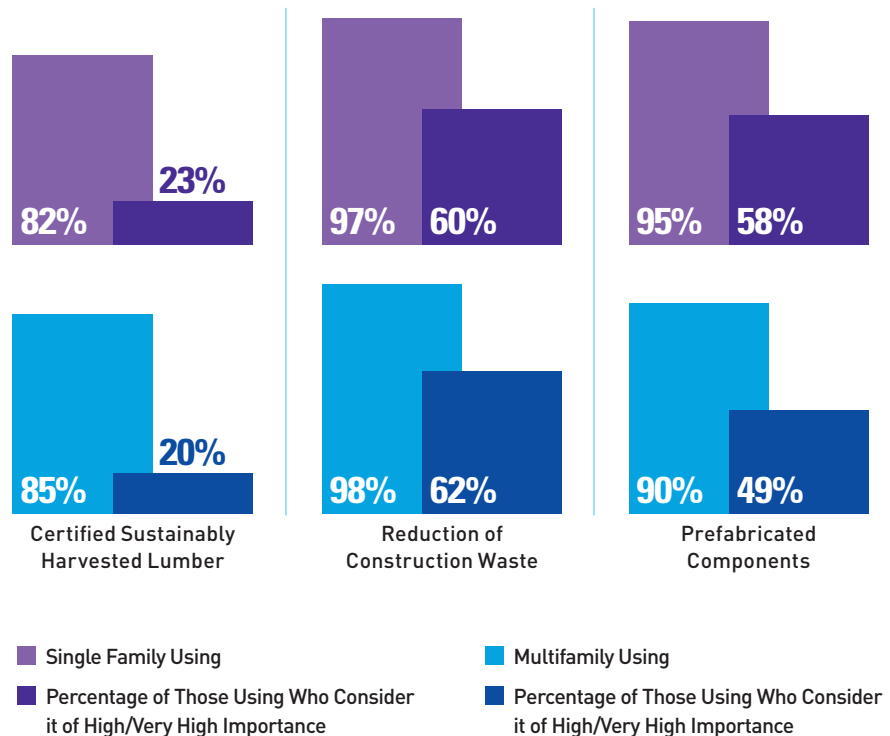
Nearly all single family and multifamily respondents report that they reduce construction waste on at least some of their projects, and nearly two thirds of them also consider this activity important, suggesting wide industry acceptance of this practice.

### PREFABRICATED COMPONENTS

A high percentage of single and multifamily respondents report using prefabricated components, but more single family respondents consider prefabrication important than multifamily ones do. Overall, the percentage of users who consider their use important is only moderate, suggesting that other reasons besides improving performance may lie behind their use .

## Use and Importance of Certified Lumber, Reduced Construction Waste and Prefabricated Components

*Percentage currently using each practice, and among those users, the percentage who consider it important/very important to green building*



# Products

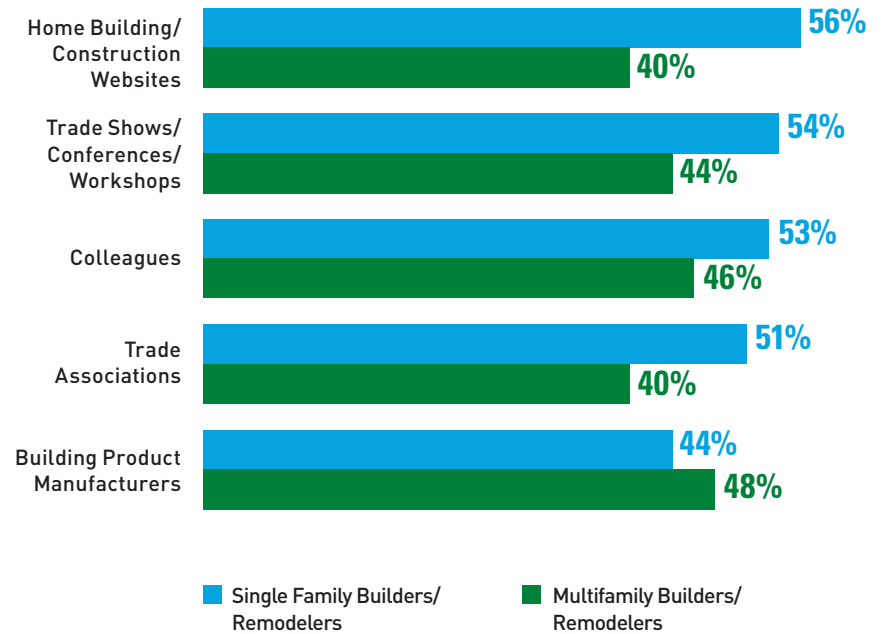
## TOP SOURCES OF INFORMATION ABOUT PRODUCTS

Single family and multifamily builders and remodelers were asked to select the sources of information they trust most from a list of 10 possible sources. The chart at right indicates the five sources of information that they trust most.

Since the same five sources of information apply to both groups, these are the most valuable ways to communicate to the builder/remodeler market about residential green products. Their selection by nearly half of respondents (ranging from 40% to 56%) suggests that all of these are of relatively equal importance. However, it is worth noting that fewer multifamily builders select four out of five than single family builders, with a notable gap in particular among those who consider home builder/construction websites and trade associations important. This may suggest more challenges to those trying to reach the multifamily builder market, and the need to utilize multiple sources of contact.

**GREEN INVOLVEMENT:** There are no significant differences in the percentage selecting each item based on level of involvement with green building among single family respondents. Therefore, similar strategies can be used to reach green and non-green home builders alike. Given the relatively even level of importance among these methods, those strategies should most likely involve using multiple forms of outreach.

## Top Five Most Trusted Sources of Information for Green Building Products and Services



# Products

## TOP-OF-MIND BRANDS FOR GREEN PRODUCTS

Respondents were asked to name brands that they associate with green for 10 product categories. Those selected by 5% or more are listed in the table at right. This question has been asked since 2006, and the previous findings are listed as well.

The colors indicate the ranking by category and year for each brand. The chart reveals significant growth in brand recognition in the last decade, although first and second rankings tend to stay consistent.

PRODUCT CATEGORY	2006	2008	2011	2014	2015	2016
<b>DOORS &amp; WINDOWS</b>						
Anderson	15%	17%	18%	16%	20%	16%
Pella	11%	12%	14%	12%	12%	11%
Marvin		8%	12%	14%	11%	10%
Jeld Wen				13%	5%	6%
Ply Gem						5%
Therma-Tru			6%			
<b>INSULATION</b>						
Owen Corning	29%	26%	25%	22%	23%	22%
Certain Teed			6%	6%	7%	7%
Icynene			9%	7%	6%	6%
Johns Manville				5%		6%
Dow				5%		
<b>WATER CONSERVATION/ PLUMBING</b>						
Kohler	22%	21%	32%	29%	29%	24%
Delta		14%	16%	18%	18%	17%
Moen			14%	17%	10%	16%
Toto			6%			
<b>HVAC</b>						
Trane	17%	17%	20%	16%	15%	20%
Carrier	12%	14%	12%	20%	10%	18%
Lennox	10%	13%	8%	9%	10%	12%
Bryant					5%	
<b>PAINT/WALL FINISHES</b>						
Sherwin-Williams	21%	32%	39%	37%	45%	52%
Benjamin Moore		8%	12%	10%	8%	10%

PRODUCT CATEGORY	2006	2008	2011	2014	2015	2016
<b>APPLIANCES</b>						
GE		34%	26%	33%	26%	29%
Whirlpool		13%	15%	11%	13%	13%
Bosch			7%	7%	8%	5%
Frigidaire						5%
KitchenAid			6%			5%
Kenmore				6%		
<b>SIDING</b>						
James Hardie	11%	19%	38%	42%	38%	38%
LP					7%	10%
CertainTeed			11%	12%	7%	6%
<b>EXTERIOR FRAMING</b>						
Trex	31%	27%	24%	18%	19%	18%
Azek				7%		5%
<b>FLOORING</b>						
Shaw			9%	6%	7%	9%
Armstrong			7%	10%	5%	7%
Mohawk					8%	6%
Bamboo			6%	7%		
<b>ELECTRICAL/LIGHTING</b>						
LED				8%	8%	10%
Progress				9%	6%	8%
GE				6%		6%

- First
- Second
- Third
- Fourth
- Fifth

# Renewable Energy and Net Zero Homes

## RENEWABLE ENERGY OFFERINGS

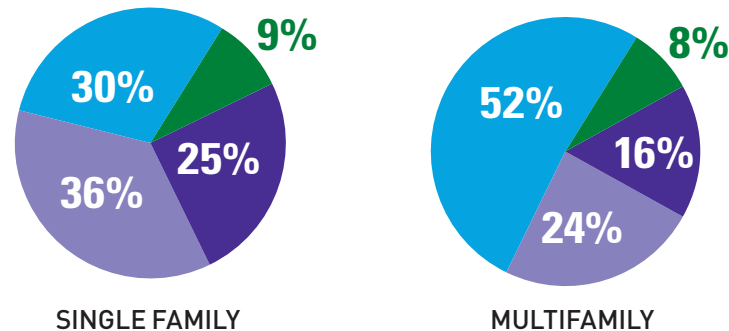
Offering renewable energy options is still relatively limited in the residential market, but more builders expect to do so in the next three years, especially single family builders. Less expensive renewable energy technologies, leasing options for some technologies and wider public acceptance of renewables help to fuel this growth.

Single and multifamily builders were asked about their current approach to and future plans for renewable energy, from incorporating them into all their projects to not offering them at all. The chart at right indicates their responses.

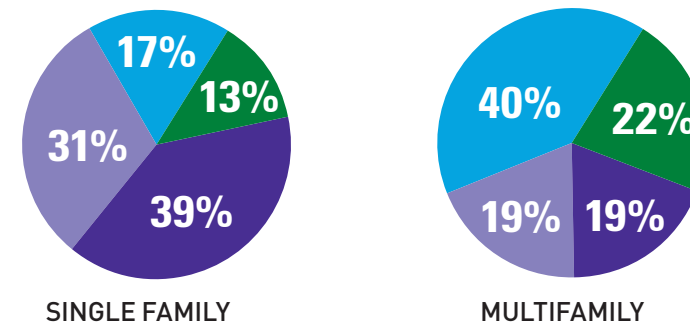
- The percentage of single family builders who expect to offer them on all projects will grow in the next three years, but still remain relatively small, at 13%.
- The percentage of single family builders who plan to offer renewable energy as an option increases dramatically from 25% to 39%, and those who do not offer decreases by nearly half, from 30% to 17%.
- More multifamily builders also expect to provide renewable energy in the next three years, but the greatest growth among them is in those who expect to incorporate renewable energy into all their projects, nearly tripling from 8% to 22%.

**GREEN INVOLVEMENT:** Nearly one quarter (23%) of dedicated green single family builders (more than 90% of projects green) currently incorporate renewable energy into all their projects, compared with only 6% of those doing fewer green projects.

## Current Renewable Energy Offerings



## Renewable Energy Offerings Expected in the Next 3 Years



- Renewable Energy Incorporated Into All Projects
- Offer Renewable Energy as an Option
- Only Offer Renewable Energy Upon Request From Owner
- Do Not Offer Renewable Energy

# Renewable Energy and Net Zero Homes

## RENEWABLE TECHNOLOGIES IN USE

### SINGLE FAMILY BUILDERS

In the previous and current study, single family builders were asked whether they used five specific renewable technologies in the previous year. They were then asked whether they expect to use those technologies in the next two years. The results are shown in the chart below.

While groundsource heat exchange remains the most popular technology across all three time periods for single family builders, the use of solar photovoltaics has rapidly increased in the last two years, narrowing the gap. In fact, while there was a 10 percentage point difference between the two technologies in 2014,

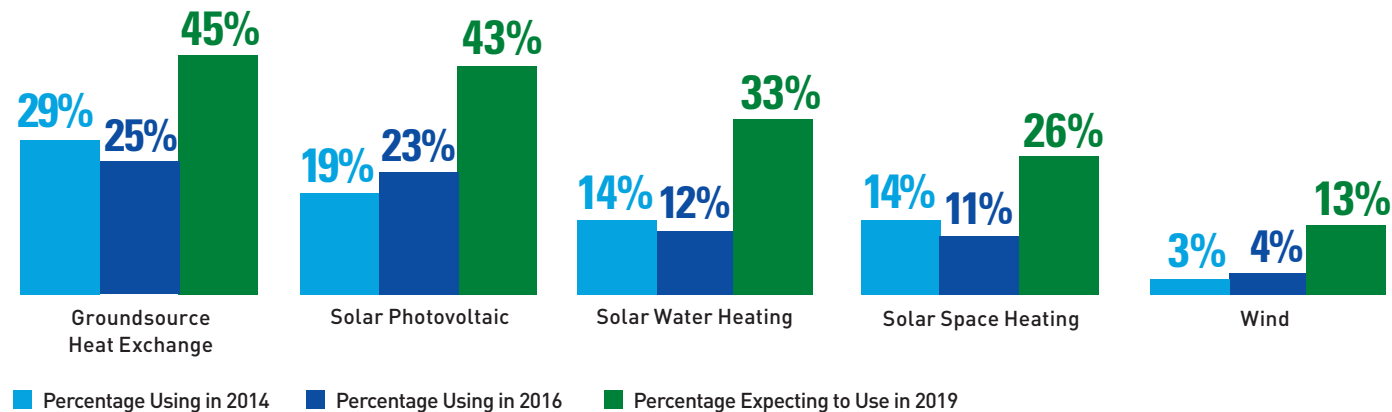
by 2016, their use is in near parity, and is expected to remain in near parity through 2019, when nearly half of builders expect to be using these technologies.

Use reported for solar water heating and space heating, on the other hand, declined slightly but not significantly since 2014, although expectations about use of these technologies is still relatively strong for 2019. Relatively inexpensive energy prices may be dampening these markets.

Wind remains a rarely used technology, and even the strong growth expectations in the next two years still place it at half or less than the use of the other technologies. *(continued on next page)*

### Single Family Builders' Use of Renewable Technologies

Percentage who reported using them in 2014 in the previous study, those who report using them in 2016 in the current study and those who expect to use them by 2019





# Renewable Energy and Net Zero Homes

## RENEWABLE TECHNOLOGIES IN USE

*(continued from previous page)*

### MULTIFAMILY BUILDERS

Multifamily builders were asked about their use in 2016 of the same technologies as single family builders in the current study, but they were not included in the previous study. The chart below therefore includes just the percentage currently using these technologies and those who expect to do so by 2019.

By far, the most popular technology for multifamily builders is solar photovoltaics, with over one quarter (27%) currently using them and twice as many (54%) expecting to use them by 2019. Solar water and space heating are also currently

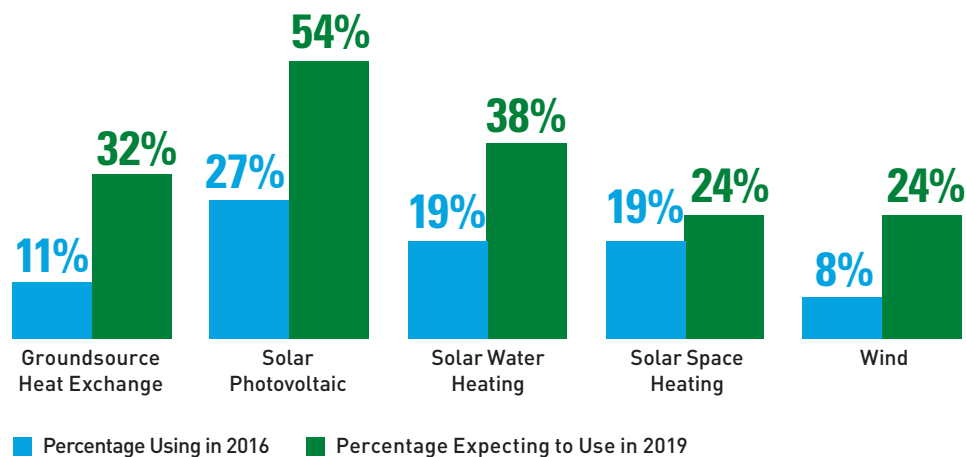
used by 19%, but a higher percentage expect to use solar water heating than space heating by 2019.

Unlike with single family builders, groundsource heat exchange is currently a distant fourth in use. However, dramatic growth is expected in the next couple of years for that technology, with the percentage using it nearly tripling.

Twice the percentage of multifamily builders report using wind in 2016 compared with single family builders, but use is still relatively low at just 8%. However, multifamily builders are more optimistic about its use in the future than single family builders, with that percentage tripling to 24%.

### Multifamily Builders' Use of Renewable Technologies

*Percentage who report using them in 2016 and those who expect to use them by 2019*



# Renewable Energy and Net Zero Homes

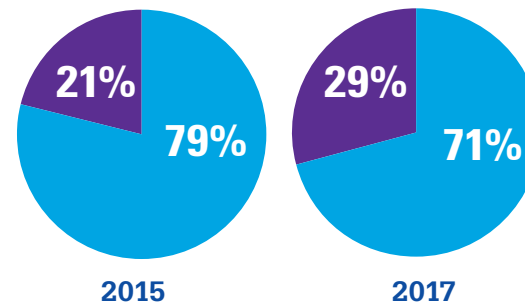
## BUILDERS DOING NET ZERO HOMES

Single family builders were asked in the current and previous study (published in 2015) whether they had built a net zero, near net zero or net zero ready home in the last two years. They were also asked whether they expect to build one of these homes in the next two years. The findings are indicated in the chart at right, and they demonstrate that net zero homes are neither a fad nor an aspirational goal, but a very real and growing segment of the single family residential marketplace.

In just two years, the percentage who report having built at least one net zero/near net zero/net zero ready home has increased from 21% to 29%. And nearly half (44%) expect to do one of these homes in the next two years.

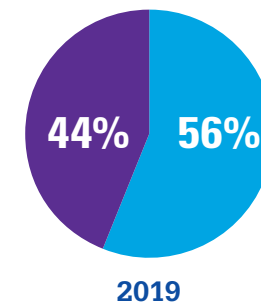
**GREEN INVOLVEMENT:** Not surprisingly, most dedicated green builders (71%) expect build a net zero/near net zero/net zero ready home in the next two years, and very few builders currently not building green (4%) will do so. It is notable, though, that one third of those just minimally involved with green building (1% to 15% of their projects green) believe that they will build a net zero home in the next two years, even though only 8% have done one so far. This suggests a growing market for this approach to building homes.

### Built in the Last Two Years



- Built a Net Zero/Near Net Zero/Net Zero Ready Home
- Has Not Built a Net Zero/Near Net Zero/Net Zero Ready Home

### Expect to Build in the Next Two Years



- Plans to Build a Net Zero/Near Net Zero/Net Zero Ready Home
- Does Not Plan to Build a Net Zero/Near Net Zero/Net Zero Ready Home

# Renewable Energy and Net Zero Homes

## DRIVERS FOR MORE NET ZERO HOME BUILDING

Single family builders were asked to rate the impact of several factors on their decisions to build net zero homes in the next two years, on a five-point scale from highly negative to neutral to highly positive. The chart at right indicates the percentage who reported a positive/highly positive influence from each of these factors.

Nearly all of the factors included in the study were considered to have a positive impact by more than three quarters of builders, suggesting the influence of several factors in driving the construction of net zero homes.

- The highest percentage considered customer demand the most influential factor, as would be expected.
- Most builders would also be influenced to build a net zero home if they could charge their customers for it. This suggests public awareness of the advantages of a net zero home will be important to influence the market.
- Builders clearly see net zero as a potential differentiator for their business, with 82% seeing a positive influence from having a competitive advantage.
- Making these cost effective through less expensive renewable technologies also influences 81%.
- Cost is a greater concern than technical knowledge, but more data is still considered influential by 60%, suggesting that additional builder education will also help drive this market

## Factors That Will Influence Builders to Construct Net Zero Homes in the Next Two Years

Percentage reporting a positive impact on their decision to build



# Key Findings

## GREEN BUILDING MARKET ACTIVITY

Green building activity continues to increase among single and multifamily builders and remodelers, with the greatest growth by 2022 expected in those doing more than 90% of their projects green (dedicated green builders).

- 33% of single family builders and 36% of multifamily builders are currently doing more than 60% of their home building projects green.
- By 2022, the percentage of dedicated green single family builders grows from 19% to 31%, the percentage of dedicated green single family remodelers nearly doubles from 12% to 23% and the percentage of multifamily builders grows from 29% to 40%.
- Far fewer green single family or multifamily builders and remodelers find that the incremental cost of building green exceeds 10% compared with the 2014 study.
- The majority of single family and multifamily builders/remodelers believe their customers are willing to pay more for green, with single family builders leading the pack at 71% and multifamily builders still strong at 57%.

## MARKETING GREEN HOMES

Multifamily builders see marketing advantages in

green homes, but single family builders are more ambivalent.

- 54% of multifamily builders find green homes easier to market, and only 13% find them more difficult.
- Single family builders are nearly evenly split between those who find green homes easier (34%) more difficult (29%) or neutral (37%) to market.

The most effective terms for marketing green homes are “long-term utility cost savings” and “operating efficiency,” but “healthier homes” is also considered effective by nearly half (44%) of single and multifamily builders.

## DRIVERS AND OBSTACLES OF GREEN HOMES

Changes in the influence of drivers and obstacles for single family respondents suggests a maturing green market, but multifamily builders/remodelers still are influenced by a few key factors.

- No single driver influences single family respondents, with seven drivers reported as important by between 51% and 64%.
- Higher first costs are a much lower obstacle for single family builders than they were in the past.
- Multifamily builders still struggle with first costs,

and they see financial incentives from government or utilities as a key driver for future green building.

## GREEN PRODUCTS, PRACTICES AND FEATURES

Energy efficiency continues to be considered the most important practice for improving home performance by all respondents, and a healthier indoor environment is a strong second. Single family respondents also consider durability important, while multifamily respondents place greater weight on water efficiency.

## NET ZERO AND RENEWABLE ENERGY

Builders’ use of renewable technologies continues to grow, especially solar and groundsource heat exchange, and the lower cost of these technologies compared with a few years ago is helping to drive more net zero homes.

- About one quarter of single family builders are using ground source heat exchange and solar technologies now, and over 40% expect to do so by 2019.
- 29% of respondents have built a net zero/near net zero/net zero ready home in the past two years, an 8 percentage point jump from 2015.
- Strong growth is likely in the future: that percentage is expected to nearly double to 56% by 2019.

# Research Demographics

## SURVEY

An online survey was conducted from December 16, 2016 to April 3, 2017.

## RESPONDENTS

A total of 342 responses are included in the final analysis, including 231 single family builders/developers, 63 single family remodelers, and 48 multifamily firms. Many respondent firms worked on multiple types of projects, such as builders who also do remodeling or firms that do both single and multifamily construction. Respondents were classified into one of the three groups based on their reporting of what their primary function was in 2016.

The total sample size used in this survey benchmarks at a 95% confidence interval, with a maximum margin of error of 5.3% for dichotomous items.

## GREEN INVOLVEMENT

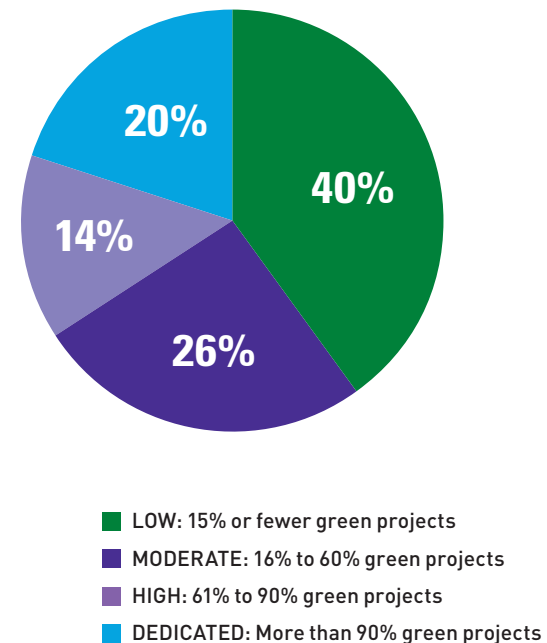
The major analytic variable used for the report, other than the type of builder/remodeler, is the level of green involvement reported by single family respondents. The pool for this analysis was the 259 single family respondents who indicated the share of green projects in their current portfolio. There were insufficient multifamily respondents for a similar analysis. The chart at right represents the four categories of involvement.

## DEFINITION OF GREEN BUILDING USED

Home builder, remodeling/renovation and land development that incorporate environmentally sensitive site planning, resource efficiency, energy and water efficiency, improved indoor environmental quality and homeowner education, or projects that would comply with ICC 700 National Green Building Standard or other credible rating systems.

## Level of Green Involvement

*Based on single family builders/remodelers' share of projects that are green*



# Contacts and Resources

## DD&A EDITORIAL TEAM

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**Stephen A. Jones**  
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**Donna Laquidara-Carr**  
Ph.D., LEED AP  
Research Director  
Industry Insights

## ADDITIONAL RESOURCES

### PREMIER PARTNER



Sustainability &  
Green Building

The National Association of Home Builders is a Washington-based trade association representing more than 140,000 members involved in home building, remodeling, multifamily construction, property management, subcontracting, design, housing finance, building product manufacturing, and other aspects of residential and light commercial construction. NAHB is affiliated with 700 state and local home builders associations around the country. NAHB's builder members will construct about 80 percent of the new housing units projected for this year. National Association of Home Builders [www.nahb.org](http://www.nahb.org)

### RESEARCH PARTNER

National Multifamily Housing Council [www.nmhc.org](http://www.nmhc.org)

ASHRAE [www.ashrae.org](http://www.ashrae.org)

Database of State Initiatives for Renewables & Efficiency  
[www.dsireusa.org](http://www.dsireusa.org)

EnergySta [www.energystar.gov](http://www.energystar.gov)

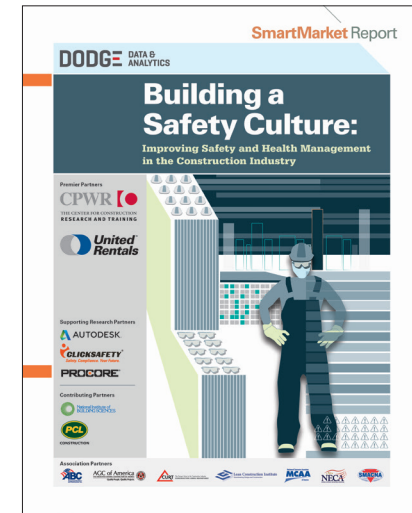
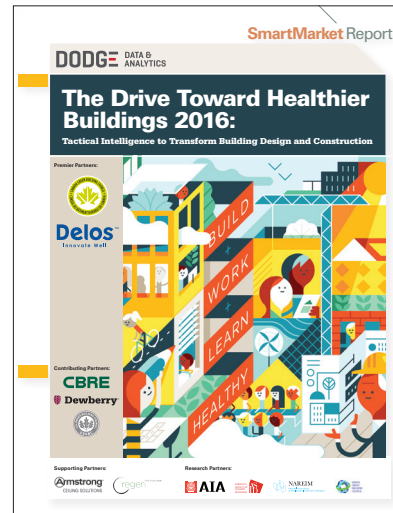
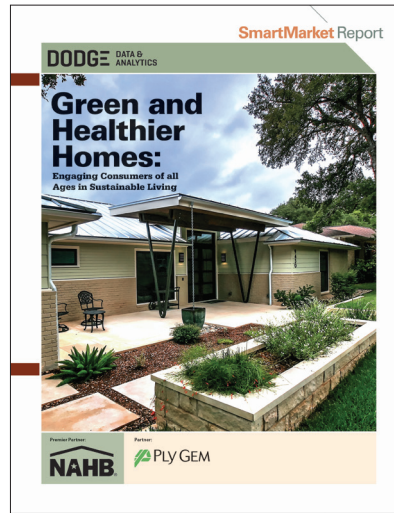
US Department of Energy [www.energy.gov](http://www.energy.gov)

US Green Building Council [www.usgbc.org](http://www.usgbc.org)

WaterSense [www.epa.gov/watersense](http://www.epa.gov/watersense)



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