Californian Realtors’ Perceptions towards Energy-Efficient ‘‘Green’’ Housing

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Abstract Realtors are seen as important enablers of behavior change toward a low-carbon future through the communication of sustainability measures to home buyers and sellers. In 2012/2013, research was conducted to assess Californian Realtors’ knowledge of, and perceptions towards, sustainable housing using an online survey instrument. The majority of respondents consider good insulation to be the most important feature to contribute to a more sustainable home, yet the green features that buyers most commonly ask about are dual-paned windows and tankless hot water. The biggest barriers to incorporating energy-efficient features into a home continue to focus on cost and poor access to information. Realtors could play a key role to overcoming barriers by providing accurate and relevant information to consumers to improve their understanding of energy efficiency and address misconceptions.

The Kyoto Protocol went into effect on February 16, 2005. It is an international environmental treaty designed to reduce greenhouse gas concentrations in the atmosphere to help address climate change. However, it has not yet been signed by two of the world’s largest emitter’s, the United States and China, which together are responsible for 45% of global greenhouse gas emissions. On November 12, 2014, these two countries announced new targets to reduce carbon pollution: President Barak Obama pledged that the U.S. would cut emissions 26%–28% below 2005 levels by 2025, while China pledged to cap emissions by 2030 and to increase its share of energy that does not come from fossil fuels to 20% by 2030 (The White House, 2014).

Over two-thirds (69.4%) of the electricity in the U.S. is generated by burning coal, petroleum, or natural gas; another 21% is generated by nuclear power stations; and less than 9% comes from renewable sources, with 7% of that from hydro dams. The burning of non-renewable energy sources to supply buildings with electricity makes buildings responsible for the largest share of U.S. carbon dioxide emissions. There are approximately 135 million buildings in the U.S., and 95% of these are homes. Buildings, primarily housing, account for 40% of total U.S. emissions, with 22% of the nations’ energy used on the housing sector (U.S. Department of Energy, 2010). The majority of homes were built prior to 2000 (89%) before the new energy codes that require energy-efficient features and that apply to new construction were introduced.

The U.S. Climate Change Science Program estimates that homes can achieve carbon emission reductions up to 70% with current best practices (McMahon,
McNeil, and Ramos, 2007) and the U.S. Department of Energy (2008a) Building America Program aims to reduce the energy use of new homes by 70% by 2020. Exhibit 1 shows that most of the energy used in a home goes towards heating and cooling. According to the U.S. Department of Energy (2008b), this use is often more affected by the size of the house than the number of occupants. Heating, cooling, and water heating are still the largest single energy end-uses in a home, despite the increased energy efficiency of this equipment. According to the U.S. Environmental Protection Agency (2012), air sealing coupled with insulating a home’s shell is often the most cost effective way to improve energy efficiency and comfort. Further, as windows can allow cold air to infiltrate (and hot air to escape) in winter and hot air to infiltrate (and air-conditioned cooler air to escape) in summer installing energy-efficient windows, doors, and skylights is also a cost-effective method to improve the energy efficiency of a home. If building, using a passive solar design is also cost effective.

In this paper, I report the results of an online survey of Californian Realtors’ perceptions towards energy-efficient “green” housing and how sustainable housing is perceived by buyers and sellers. The next section covers the literature review. The methodology is then outlined, with the results, conclusions, and recommendations following.

**Literature Review**

As mentioned above, it is the house size that affects the use of heating and cooling in a home and these uses consume the most energy. The average size of new houses in many countries has grown significantly over the past twenty years. Until 2008, the U.S. had the largest average size new home. Now Australia leads with the an average new single-family house size of 214.6 m$^2$, according to James (2009), followed by the U.S. at 201.5 m$^2$, New Zealand at 196.2 m$^2$, and Canada at 181 m$^2$.

At the same time, the average household size in the U.S. decreased to 2.54 persons per household (Statistica, 2014). Small households are less efficient as fewer people are sharing space and resources. Fortunately, the U.S. government is taking action to address the energy inefficiency of homes.

**Government Actions**

**Building Codes.** In the U.S., new building energy codes and legislation have been introduced on a state-by-state basis to improve the energy efficiency of homes (Exhibit 2). Thirty states have adopted the 2009 International Energy Conservation Code (IECC) or better. California, Illinois, Washington, and Washington D.C. have adopted the 2012 IECC. Adopting the 2012 IECC, with energy efficiency standards 28% stronger than the 2006 code, can help reduce carbon emissions in homes.

Issues identified by Sewalk and Throupe (2013) are that homes have insufficient insulation, with homes built before the 1970s having little or none. Window
glazing is another weakness, with windows being either single glazed or double glazed but with no argon or xenon gas. At least energy-efficient lighting, the replacement of incandescent with florescent lighting, is mandated by law.

However, requiring homes to be updated to meet building codes can have negative consequences such as making them less affordable to purchasers due to the additional cost required to update them, according to Sewalk and Throupe (2013). They analyzed the cost to bring homes into compliance with the 2012 projected energy code. Data was collected on 130 homes in Denver, Colorado. Homes ranged in value from $124,000 to $883,646, with an average price of $344,333 (standard deviation: $188,608). The average update cost was $22,091, and with an average term of home ownership of seven years would equate to $3,156 per year. However, most homeowners do not update their homes on an annual basis; rather this cost is incurred at the time of sale as it would be required to sell the home. This has the negative consequence of making it less affordable, and thus less appealing, to purchasers, unless the energy savings can compensate for the additional cost.

**Mandatory Disclosure Regulations.** A small number of U.S. states and cities have adopted building energy rating and disclosure laws to help meet their energy savings and carbon emissions reduction goals (Exhibit 3). The laws are designed to ensure that real estate markets value energy efficiency by requiring information about building energy performance to be disclosed to potential buyers, renters,
Exhibit 2 | Building Energy Codes and Legislation in the U.S.


Exhibit 3 | Mandatory Building Energy and Disclosure Laws

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Year Adopted</th>
<th>Policy Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austin TX</td>
<td>2008</td>
<td>Residential and commercial building rating and disclosure under the Energy Conservation Audit and Disclosure (ECAD) ordinance.</td>
</tr>
<tr>
<td>Kansas</td>
<td>2003</td>
<td>Asset rating and disclosure for new homes is required</td>
</tr>
<tr>
<td>Fayetteville, AK</td>
<td>2012</td>
<td>HERS rating required for new homes under the energy code.</td>
</tr>
<tr>
<td>New York State</td>
<td>1981</td>
<td>Truth in Heating Law requires residential building owners to disclose energy bills to prospective buyers and renters if requested.</td>
</tr>
</tbody>
</table>

Note: This table has been adapted from Hill and Dunsky (2013).
and the public. These mandatory disclosure laws can help transform markets by motivating voluntary energy efficiency upgrades.

Current building energy rating and disclosure policies and laws in place across the U.S. require property owners to evaluate their buildings using rating tools that measure either the building’s physical characteristics and mechanical equipment, referred to as an “asset rating,” or evaluate the actual energy performance of the building, called an “operational rating.” According to Hill and Dunsky (2013), these laws have so far focused solely on asset ratings, mainly due to the significant impact on energy consumption from occupant behavior that makes comparisons between homes difficult. However, voluntary operational ratings are available in many states. For example, the Department of Energy is supporting pilot programs in Massachusetts, Virginia, Alabama, and Washington that provide voluntary energy evaluations, including Energy Performance Score (EPS) ratings (based on energy use), as part of an efficiency upgrade and financing initiative.

The asset ratings assess the theoretical performance of the physical envelope and major systems of the home or building, using energy modelling software and diagnostic tests. A range of residential property asset rating tools and auditor certifications exist, including the Home Energy Score (HEScore), the Energy Performance Score (EPS), and the Home Energy Rating Score (HERS).

The HEScore was developed by the Lawrence Berkeley National Laboratory and launched in 2012. The Home Energy Score compares a building to a clearly defined baseline. It requires qualified professionals to conduct the assessment, and provides a label displaying how efficient a home is on a 10-point scale: a “1” applying to homes likely to use a lot of energy and a “10” corresponding to the most efficient homes. The calculation methodology takes into account local climate and applies standard assumptions regarding occupant behavior, providing a consistent, national, standardized approach. As of August 24, 2014, 12,984 homes have been scored (U.S. Department of Energy, 2014).

The Energy Performance Score (EPS) is an energy performance asset rating tool developed by the Earth Advantage Institute and the Energy Trust of Oregon. The EPS is a metric that reflects the energy and carbon impact for a home and allows for home-to-home comparison. It requires qualified professionals to conduct the assessment. It has three components: the audit, the scorecard, and the recommendation report to guide improvements in a cost effective manner (Energy Trust of Oregon, 2014). The scorecard shows the score from zero (most energy efficient) to 200 (least energy efficient). The score indicates the energy use per home (rather than by square foot) and the total energy use is converted to a kWh number.

The Home Energy Rating Score (HERS) is an energy performance asset rating tool developed by the Residential Energy Services Network (RESNET), an independent, non-profit organization to help homeowners reduce the cost of their utility bills by making their homes more energy efficient. The HERS Index Score compares a home’s energy rating against a “reference home,” a designed model home of the same size and shape as the actual home. The score requires a certified
RESNET HERS Rater to complete the energy rating (RESNET, 2014). Rated homes are provided with a score from zero (most energy efficient) to 150 (least energy efficient) with 100 being the reference home built to 2004 IECC code (Adams, 2012).

**Green Rating Labels for Homes**

The home rating labels (as opposed to scores) do not measure actual performance but verify that homes are designed and built to be energy and resource efficient. Like many of the above scoring types, they do not take occupant behavior into account and are generally only available for new builds. One of the first home rating systems in the U.S. was the ENERGY STAR for homes introduced in 1995. The ENERGY STAR program is jointly sponsored by the U.S. Environmental Protection Agency and the U.S. Department of Energy. There have been various versions of ENERGY STAR for homes with Version 3 introduced in 2012 taking into account new technology and new building codes and standards. The Energy Star Certified New Homes Market Indices for States compares the number of site built, single family ENERGY STAR certified new homes to the number of new privately owned one-unit homes permitted in each state. California has an ENERGY STAR Certified New Homes Market Index (share) between 10% and 19% with 153,338 ENERGY STAR certified homes built to date; 7,090 ENERGY STAR certified homes were built in 2012 (EPA, 2012).

An industry-led initiative by the U.S. Green Building Council (USGBC) is the LEED for Homes Rating System, introduced in 2008. By comparison to ENERGY STAR, as of June 2012, the USGBC only has 20,000 LEED certified homes (USGBC, 2012). California has 938 projects or 6,835 homes as at May 2013 (USGBC, 2013). In California, Build It Green is a membership-supported non-profit organization established in 2005 that developed the GreenPoint rating program for both new and existing homes. As of April 22, 2013, Build It Green has certified over 15,000 homes (Build It Green, 2013).

**Towards Sustainability in Homes**

The National Association of REALTORS® (NAR, 2014) emailed a survey of buyers’ home feature preferences. Using a random sample weighted to be representative of sales on a geographic basis, surveys were mailed to 72,206 home buyers in the U.S. who had purchased a home between July of 2013 and June of 2014. Consumer names and addresses were obtained from Experian, a firm that maintains an extensive database of recent home buyers derived from county records. A total of 6,572 responses were received, yielding a usable response rate of 9.4%. Heating and cooling costs were at least “somewhat” important to 86% of home buyers (down slightly from 88% in 2010). Energy-efficient appliances and energy-efficient lighting were “very” or “somewhat” important to two-thirds of home buyers. Landscaping for energy conservation and environmentally friendly community features had some importance to the decision of just under half of buyers. By region, environmentally friendly features varied in importance. Heating and cooling costs are more important to buyers in the Northeast and the
South than other regions. Energy-efficient lighting and landscaping for energy conservation are more important to buyers in the West than other regions. These results are comparable to the NAR (2010) results (111,004 U.S. consumers were mailed a survey, and 8,449 usable responses were received for 7.9% response rate). A new question in the 2014 survey asked about the importance to buyers of solar panels installed on the home with 89% responding that these are not important in their purchasing decisions.

Previous research and literature [e.g., a report by Noble and Martinelli (2009) in Australia, Bond (2010a) reporting on results of a postal survey of 1,250 randomly selected residents in Australia to identify their attitudes towards climate change and the drivers and barriers towards energy efficiency in the home, and Bond (2013) reporting on the results of a similar postal survey of 4,000 New Zealand to identify and explain user behavior in residential buildings in relation to the energy consumed] shows that factors affecting the willingness of householders to undertake sustainability improvements include the amount of time involved, effort required, level of comfort provided, and the cost and long pay-back periods. Shipworth (2000) outlines a range of strategies to motivate home energy action. She outlines when and what type of information motivates, as well as a range of financial incentives that can be used.

**The Cost of Going Green**

While a perceived barrier to investing in green buildings is that they cost more compared to conventional buildings, most studies to date are of commercial buildings and show the true cost to be negligible (Matthiessan and Morris, 2004, 2007; Ciochetti and Gowan, 2010). However, some tabulate the cost to be as high as 7% (Kats, 2003; Miller, Spivey, and Florance, 2008). These variances may be caused as much by how the researchers measure the cost premium (Morris, 2007), with some comparing the cost of a green project with the original project budget, or the cost of the building with individual added green features compared to the cost of the building without those features, while others compare the cost of population of buildings without green features with a population containing green features. The latter approach was used in Australia by Davis Langdon (2007) to determine the cost of achieving specific levels of green (under the Australian Building Council Green Star rating system). They found that the initial impact on construction costs (above comparable non-green projects) is likely to be on the order of 3% to 5% for a 5-star solution, with an impact of a further 5% plus for a 6-star non-iconic design solution.

As found in Bond (2010b) and discussed in Morris (2007), sustainable features can be incorporated into most building types at little or no additional cost, especially if an integrated approach is taken early in the design process so that all building elements work together. In addition, it is helpful if all involved in the building process are on-board with the design, construction, and use of the building from the design team to the end user, including the construction team and building manager. Finally, many design teams make trade-offs—they can offset the costs of green features by reducing the extent of other expensive finishing materials.
Evidence of the Value of Green Rating for Homes

In 2007, the Australia Government (Department of the Environment, Water, Heritage and the Arts, 2008) conducted one of the first studies to determine if home buyers are willing to pay a price premium for sustainable homes. The Australian Capital Territory (ACT) was the first jurisdiction in Australia to introduce mandatory energy disclosure for all houses on the market in 1999. The Energy Efficiency Rating (EER) indicates the thermal performance of the building shell only and excludes the hot water and lighting system and other fixed or movable appliances. The output shows a star rating of between 1 and 10, with 10 being the most energy-efficient home. The study looked at whether a relationship exists between the EER of a house and the sale price. The sample consisted of over 5,000 homes that sold in 2005 and 2006 built before 1995 when new building regulation minimum energy performance standards were introduced that required new houses reach a 4-star energy standard (this stringency was increased to 5 stars through the Building Code of Australia in 2006). All houses built after 1995 were excluded from the dataset to avoid any impact of the new minimum performance standards. The average house size in the study sample was around 141 m$^2$ on a lot of 836 m$^2$ located in a suburban setting with an average energy performance just below 1.7 stars. The relationship of EER to price on average for 2005 was 2.5% for each 1 EER star and 3.8% in 2006, holding all other variables constant. However, when the study takes account of the energy label and energy efficiency characteristics of the house separately, the size of the label effect falls, but it remains positive and significant in almost all cases.

Khan and Kok (2012) examined at the market implications of a green rating on house price in California. The green ratings included the EPA’s ENERGY STAR Version 2 rating, LEED for Homes, and GreenPoint. The sample consisted of owner-occupied single-family homes that sold in California in 2007–2012: 4,231 green homes and 1,600,558 control homes. Seventy percent of the homes with a green label that were sold during this time period were new construction. Homes with a green rating sold for a premium of 12% on average, all other variables held constant. However, LEED for Homes and GreenPoint were insignificant in the models. For homes constructed in the last five years, the green-rated price premium was only 8.7%.

Brounen and Kok (2011) investigated the effect of energy performance certificates in the Netherlands. First, they looked at the factors that influence whether or not a home has an energy rating, and if a home does have an energy rating, they investigate the effect that has on the transaction price of the home. Their results indicate that larger buildings are less likely to have an energy label and that label adoption tends to be associated with difficult selling conditions. Homes with an A, B or C energy label (“green” labels) receive a price premium of 3.7% ceteris paribus. Homes with an A rating tend to sell at 10.2% higher than similar homes with a D rating. They also find that homes with a G rating sell at 5% less than similar D rated homes, all else being equal.

A review of the literature by Hyland, Lyons, and Lyons (2012) found that green buildings trade at a discount of 5.5% in Japan, energy performance certificates of
homes have limited effect on purchasing decisions in Germany, but in the Netherlands and Australia, buildings certified as energy efficient sell at a premium. This premium ranged from 2.5% for each star increase to 10.2% for an A rated home compared to a D rated home or on average, 3.7% for a green label: A, B or C. The authors conducted their own study in Ireland and found that energy efficiency has a positive effect on both the sales and rental prices of properties. The effect of the energy rating was found to be stronger where market conditions are worse, similar to the finding by Brounen and Kok (2011). The dataset comprised 397,258 properties listed for sale and 888,211 properties listed for rent from 2008 to 2012. Of these listings, the Building Energy Rating (BER) certificate was known for 5% of properties for sale and 2.3% of properties to let. Homes that had been assessed were given a rating from A1 to G (where A1 is the most efficient) on the basis of the efficiency of the space and water heating, ventilation, insulation, and lighting fixtures in the building and reported the carbon dioxide emissions associated with the building (expressed as kgCO$_2$/m$^2$/year). The results of the study show that, relative to obtaining a D energy rating, an A-rated property receives a price premium of 11%, while a B rating increases the price by 5.8%. At the other end of the scale, receiving an F or G rating reduces the price by 5.6%, ceteris paribus. These results are consistent with those of Brounen and Kok (2011).

**Summary**

This literature review has outlined the drivers to address the energy efficiency of homes such as stricter building codes, mandatory disclosure regulations, and the introduction of green rating labels. Further, it outlines studies undertaken of consumer attitudes towards sustainability. Generally, existing homes are still performing poorly in terms of energy and water efficiency, despite improvements to the building codes, the introduction of rating tools to measure energy efficiency, and the availability of subsidies and grants for energy efficient home improvements.

According to Knowles (2008), the climate challenge is fundamentally a built environment and behavior change challenge. Energy efficiency interventions and programs are failing to live up to their potential primarily due to the failure to facilitate building occupant and building industry behavioral change.

As outlined in Adams (2012), the information available on the home’s energy performance depends on the stakeholder involved. Exhibit 4 shows the many players within the residential real estate market that provide data on a home.

Adams (2012) reports that the Local Energy Alliance Program (LEAP) in Virginia, one of the partners to pilot the HEScore outlined previously, has successfully increased energy performance rating and reporting by working directly with real estate agents. LEAP is assisting real estate agents become proponents of energy performance reporting by helping them recognize that they can provide their clients with valuable energy efficiency expertise. Ultimately LEAP aims to encourage the local real estate association to include mandatory energy efficiency fields in Multiple Listing Service (MLS) property listings.
As realtors are the professionals that people communicate with when choosing to buy, sell or rent a house, the aim of the research was to determine their awareness and understanding of sustainability and the attitudes of buyers and sellers towards energy-efficient homes.

**Research**

The broad aim of this research was to identify (1) realtors’ awareness and understanding of sustainability features in homes, (2) realtors’ perceptions of their clients’ attitudes towards energy efficient or green labelled homes, and (3) how these perceptions impact the price homebuyers are willing to pay for energy-efficient homes. Knowledge of these factors can help identify ways to build capacity within the real estate profession to communicate sustainability measures to buyers, sellers, landlords, and renters that encourage behavioral change to a more environmentally conserving one and drive demand for energy-efficient homes.

**Methodology**

An email survey was the quickest and most cost-effective way of surveying a large sample of Californian realtors. A 30-question online survey was developed with...
a cover letter introducing the research team and outlining the research’s purpose, how long the survey would take to complete, that individual responses would be kept confidential, how the results would be disseminated, and a statement confirming that the survey had Human Ethics Committee approval. Data entry and analysis of the results was carried out using SPSS and included descriptive statistics (frequency analysis of all categorical variables).

**Survey Sample**

Initially, Florida realtor were surveyed. A link to Qualtrics online survey was sent out by the NAR Green REsource Council to Green Designees on December 31, 2012 and to general (green or non-green) members of the Northeast Florida Association of REALTORS® (NEFAR). NEFAR placed the link along with a request for realtor participation on the “Members Only” portion of their website and included the same link and call for participation in a NEFAR Member Weekly Update e-blast that was sent on January 4, 2013. The requested return date was January 21, 2013. Reminders were sent out in the NAR Green REsource Council newsletter on January 28, 2013 and in the NEFAR Member Weekly Update e-blast on January 25 with the deadline extended to February 6, 2013.

Unfortunately, the response rate was very low (nine). According to NEFAR Communications Director Melanie Green “it is very difficult to get Realtors to participate in surveys. We issue calls to action frequently, on a variety of topics, and the response rate is usually quite low, even when only a yes or no. The time commitment is always a challenge.” Similarly, Amanda Stinton, media contact for NAR’s Green REsource Council commented “We do have about four to five thousand people who receive the newsletter each month, of which only a couple of hundred would open and click through on something.”

To try to attract more respondents and to see if West Coast realtors have a different attitude to sustainability, we contacted the California REALTORS® Association, who agreed to send out the online link to a Californian-tailored survey to a random sample of their 155,000 members. They agreed to provide 5,000 members’ email addresses. The survey link was emailed to members on the February 28, 2013 with the due date March 11, 2013. To encourage participation, respondents were offered the chance to win one of two $100 Barnes and Noble gift vouchers. By providing their name and email, they had the choice to go into the draw, or not. Only nine responses were received a few days before the close date, so a reminder was sent on the March 9, 2013, which increased the response rate to 110 (84 completed surveys).

**Survey Instrument**

For comparative purposes, the questionnaire was modelled on one used in research conducted in Australia in 2010 and in New Zealand in 2012. However, each country’s survey differed slightly in the questions asked, as they were tailored to the circumstances specific to each country. The Californian questionnaire commenced by asking respondents about their level of real estate sales experience and how aware they think buyers are of factors relating to energy-efficient homes.
Next questions asked about their own level of motivation to act environmentally and about the home they live in: size, number of bedrooms and bathrooms, household composition and whether they consider the energy efficiency and water rating of appliances before purchasing them. Respondents were asked questions to assess their knowledge and understanding of climate change, sustainability issues, and energy-efficient features. Questions were included to determine their perceptions of what buyers look for when buying a home and whether energy efficient or sustainable features are important to them, what the benefits are of including these features in a home, and what acceptable level of additional cost they would be willing to incur to have these in their homes. Next they were asked what they consider the main barriers to incorporating sustainable features in a home, what could be done to overcome these, and what impact mandatory reporting of energy performance might have on the market. Demographic questions were included at the end of the survey. An electronic copy of the survey is available on request from the author.

The response format comprised mostly closed questions but with the options “Other, please specify” or “Not sure” so as not to confine respondents to the predefined responses. Some open questions were included to allow respondents to provide more detailed information about the data requested or to provide further explanation for their response selections. At the end of the survey, they were invited to make any further comments. In the closed questions, a variety of categorical, ranking, and scoring (Likert scale) response options were provided and included classification, knowledge, and perception type questions.

Summary of the Results

Response Rate and Demographics

From 5,000 realtors emailed with a follow up reminder, 110 responses were received (2.2% response rate) and 84 (1.7%) answered all questions. Demographic questions revealed that 75% of respondents were female. Nearly three quarters of the respondents (74%) were 50 years of age or older (41% aged 50–59; 33% aged 60 years or older); 14% were between 40–49 years of age and 10% between 30–39 years old. Nearly three quarters (74%) were California licensed sales agents and 25% were brokers, while 2% classified themselves as “other.”

Designation and Level of Experience

Respondents were asked what professional designations they have and from what groups. Responses were mixed. Of the 100 responses, 66% were NAR, of those, 35% said they were also CAR (23% of the total respondents). In addition to NAR and CAR, others had local designations such as Lodi, Oakland; San Diego; Orange County; Pasadena-Foothills; Silicon Valley; Central Valley; Placer County; Contra Costa; and Lakeland Associations of Realtors. Thirteen percent had the Certified Short Sale and Foreclosure Resource (SFR) designation, 5% were Certified Distressed Property Experts, and 3% were both of these. Twelve percent had the
Graduate REALTOR® Institute (GRI) designation, which reflects real estate professionals who have secured a strong educational foundation. Less than 10% had the following designations: Certified Residential Specialists (CRS); the NAR E-Pro certification, e-PRO®; Senior Real Estate Specialists (SRES); Certified Negotiation Experts (CNE), and Certified HAFA (Home Affordable Foreclosure Alternatives Program) Specialists. Eleven percent said they had no designations.

Other designations listed by a few respondents included: Accredited Buyer’s Representative (ABR®); Resort and Second-Home Property Specialist (RSPS); Transnational Referral Certification (TRC Relocations); Equator Platinum Certificate; Counselors of Real Estate (CRE); Certified Design and Development Construction Professional (CDP) by the International Council of Shopping Centers; Certified Neighborhood Specialist, Accredited Land Consultant (ALC); LEED Accredited Professional, Residential Management Professional (RMP), and Certified Residential Brokerage Manager, and Certified Property Manager (CPM).

To determine respondents’ level of experience, we asked how many years they had been involved in selling real estate. Of the 110 that responded to this question, nearly half (48%) had over 10 years, 26% had 6–10 years, 12% had 1–5 years; 6% had less than one year, and 7% had “other.” Next we wanted to determine the price level they have experience in selling with this being fairly evenly spread. Of the 89 responses, on average 36% had were involved with selling property below $300,000, 33.5% between $300,000 and $500,000, and 30.4% were involved in selling homes worth over $500,000.

The number of homes respondents sold per month was 1.72, on average, with the range from 0 to 16; annually the average number of homes sold was 12.4, with the range from 0 to 50 homes. In terms of green-rated homes sold, only 12.5% (10) of respondents indicated that they had sold these homes, with the average number sold per annum been 4.4 (range: 1–20), indicating limited experience in selling green-rated homes.

**Size and Age of Home and Type of Home Buyer**

As the size of a home affects its energy efficiency, we asked respondents how big the homes are that they sell, on average. Nearly two-thirds (62.5%) of homes sold were less than 2,000 sq. ft., 26.8% were between 2,001 and 3,000 sq. ft., and 10.7% were over 3,000 sq. ft.

Newer homes tend to be more energy efficient than older ones as they need to meet more stringent building codes so we asked the age of homes sold. Over half (56%) of homes sold were older building stock (more than 20 years old), 37% were 2–19 years old, and only 7% were less than 2 years old (i.e., newer homes). We also wanted to know the types of home buyer that respondents were mainly dealing with: 40.6% on average were homes sold to families, 38% to singles and couples, 15.9% were to investors, and 5.5% to retirees.

**Buyer Awareness of Energy Efficiency**

To get an idea of how aware respondents think buyers are of the factors related to energy-efficient homes, we asked them to indicate using a Likert Scale of 1,
Exhibit 5 | Buyers’ Awareness of Energy Efficiency in Homes

<table>
<thead>
<tr>
<th>Rank</th>
<th>Response</th>
<th>Mean Average Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The benefits of having a sustainable energy and water efficient home</td>
<td>3.18</td>
</tr>
<tr>
<td>2</td>
<td>Utility company incentives for energy efficiency</td>
<td>3.25</td>
</tr>
<tr>
<td>3</td>
<td>Federal and state incentives or grants available to help fund energy</td>
<td>3.68</td>
</tr>
<tr>
<td></td>
<td>or water efficiency improvements to a home</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>The California Residential Code</td>
<td>3.73</td>
</tr>
<tr>
<td>5</td>
<td>Green rating home schemes, e.g., HERS index score, LEED for Homes</td>
<td>3.75</td>
</tr>
<tr>
<td>6</td>
<td>California energy efficiency legislation</td>
<td>3.85</td>
</tr>
<tr>
<td>7</td>
<td>The California Green Building Standards Code (CALGreen)</td>
<td>4.08</td>
</tr>
</tbody>
</table>

very aware to 5, very unaware various factors. A low mean score indicates more aware. Exhibit 5 indicates that buyers are most aware of the benefits of having a sustainable energy- and water-efficient home and least aware of the CALGreen code.

Respondents’ Level of Motivation to Act Environmentally

Next, the focus turned to respondent’s personal attitudes to sustainability, by asking how motivated they are to reduce their personal climate change emissions. Of the 85 responding, 69% of the participants were either highly (31%) or moderately (38%) motivated to reduce their impact on the environment, 12% were slightly motivated to, while 11% did not care either way. Surprisingly, given the media attention for the need to combat climate change, 7% were moderately unmotivated and 2% were highly unmotivated to reduce their personal climate change emissions.

In line with the above question, given that larger homes are more energy intensive to heat and cool, we wanted to know how big the homes are that respondents live in. As respondents may not know the size of their home in square feet, they were asked how many bedrooms their homes had, as a proxy for size. Of the 84 that responded, 48% had a 3-bedroom home, 25% had 4-bedrooms, and 10% had a large 5-bedroom home. Only 11% had a smaller 2-bedroom home, and 4% had 1 bedroom. Similarly, respondents were asked how many bathrooms their homes have, with 45% of them having two bathrooms, 25% had 3 bathrooms, 8% had 4 bathrooms, 4% had 5 bathrooms. Only 10% of homes had one bathroom, while 6% had 2.5 bathrooms. As research has shown that household size is decreasing, we asked how many people live in the home: 43% of respondents have 2 people, and 25% have 3 people, in line with the national average of 2.54.

Next we asked if respondent’s consider the energy efficiency or water rating of appliances before purchasing with nearly three-quarters (73%) saying they do, 17% say they do sometimes, and 11% do not consider this at all. Respondents
### Exhibit 6 | List of Statements

<table>
<thead>
<tr>
<th>Rank</th>
<th>Statement</th>
<th>Mean Average Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Occupant behavior within the home has a strong impact on the use of energy</td>
<td>4.16</td>
</tr>
<tr>
<td>2</td>
<td>The size of a home has a big impact on its energy efficiency.</td>
<td>3.51</td>
</tr>
<tr>
<td>3</td>
<td>Climate change can be addressed through improvements to energy efficiency in our homes.</td>
<td>3.46</td>
</tr>
<tr>
<td>4</td>
<td>It is important that buyers and tenants are informed of the likely energy performance of the home.</td>
<td>3.31</td>
</tr>
<tr>
<td>5</td>
<td>It is the role of realtor and property managers to inform buyers, sellers, landlords or tenants about sustainable features that are, or could be, implemented in a home.</td>
<td>3.01</td>
</tr>
<tr>
<td>6</td>
<td>I have experienced demand from buyers / renters looking for a home with sustainability features / improvements.</td>
<td>2.23</td>
</tr>
<tr>
<td>7</td>
<td>The materials a home is built with has little impact on its energy efficiency.</td>
<td>2.06</td>
</tr>
</tbody>
</table>

Respondents were directed to agree or disagree with various statements, using a five-point Likert scale. The aim of asking for agreement/disagreement on these statements was to ascertain the current level of understanding by participants on sustainability features within a building and whether they perceived these options to positively contribute to a more sustainable home. They most strongly agreed that occupant behavior within a home has a strong impact on the use of energy. The next most agreed with statement was that the size of a home has a big impact on its energy efficiency. Given the latter response, it is surprising that many respondents choose to live in large homes with 35% having a home with 4 or more bedrooms and 37% with 3 or more bathrooms in their homes. Exhibit 6 lists these statements.

**Features that Contribute to a Sustainable Home**

The aim of this question was to ascertain the level of respondent understanding of features within a home and how these features contribute to the sustainability...
Exhibit 7 | Features that Contribute to Sustainability in Homes

<table>
<thead>
<tr>
<th>Rank</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Good insulation (ceiling, walls, under floor)</td>
</tr>
<tr>
<td>2</td>
<td>High performance double glazing</td>
</tr>
<tr>
<td>3</td>
<td>A modern air-conditioner/heater</td>
</tr>
<tr>
<td>4</td>
<td>Energy-efficient compact fluorescent/LED lights</td>
</tr>
<tr>
<td>5</td>
<td>West-facing windows</td>
</tr>
<tr>
<td>6</td>
<td>Alternative energy generation systems (e.g. solar, Photo-voltaic (PV) or wind power)</td>
</tr>
<tr>
<td>7</td>
<td>ENERGY STAR, energy-efficient appliances</td>
</tr>
<tr>
<td>8</td>
<td>Large roof eves</td>
</tr>
<tr>
<td>9</td>
<td>Access to public transport</td>
</tr>
<tr>
<td>10</td>
<td>Other</td>
</tr>
</tbody>
</table>

of the home. These questions covered thermal performance aspects of design, energy- and water-efficient products, solar passive design principles or other lifestyle features known to impact a home’s environmental sustainability (U.S. EPA, 2012). Respondents were asked to rank these features from 1, most important to 10 least important. Exhibit 7 lists these features. Some of the features were added that do not necessarily contribute to sustainability to test what respondents really know and understand.

Respondents were asked how often homebuyers ask them about green features, such as those described above. Responses were mixed with 70% indicating never (32%) or seldom (38%). Just over a quarter (28%) responded that they are occasionally asked and 3% said “frequently.”

Next, respondents were asked, that if homebuyers ask realtors about green features, which three green features do they ask about most commonly. The features listed most frequently were windows (including dual pane, 22). In decreasing order of frequency of listed features were: air conditioning/heating (17), appliances (11), insulation (10), and solar. Other green features listed included water heater, orientation of the home, recycled materials, natural/sustainable wood, light bulbs, native plant landscaping, pool equipment, age and size of the home, and transportation. Some of the features were not strictly green features and others were clearly not related, such as school district, price, granite counter tops, and taxes.

Buyers Interest in Green Homes

To find out if buyers interest in green features has changed over time and given the increasing global attention to climate change, we asked respondents if they get asked more now about green features than five years ago. A third of the
respondents get asked more frequently, and 62% are asked about the same amount as five years ago.

**Financing Options Available for Green Homes**

Given that research shows that cost is a reason many homeowners do not buy green homes or more energy-efficient products, respondents were asked if there were more financing options available for green homes that might motivate buyers to invest in these compared to five years ago. Over two-thirds of the respondents were not sure about the availability of financing options for green homes, 17% said there were not more, and 14% said that there were.

Those that responded that there are more financing options available now than five years ago were invited to specify what these are. Responses included tax rebates, manufacturers discount, “Energy Upgrade California,” and the FHA 203K Loan. However, there may be some misunderstanding about the FHA 302K loan as it is not specifically for green homes but for remodeling and updating homes that may or may not make them more energy efficient. What FHA does offer is the Energy Efficient Mortgage Loan program, which is available to anyone who meets the income requirements for FHA’s Section 203(b) fixed-rate mortgage loan. Similarly, Energy Upgrade California is also not a financing option for green homes but instead directs consumers to a resource that has information about available financing, rebates, and incentive programs.

**Information on Green Homes**

We wanted to know if respondents had sourced information on sustainability for homes, including energy and water efficiency measures, rebates or incentives in the last 12 months and if so what source they used for this from a range of listed options. Nearly a third (32%) of respondents said they had sourced this information. The main sources used included the websites of utility companies, local counties, and the federal government. These are indicated in Exhibit 8.

**Housing Characteristics Most Important to Buyers**

To determine how important energy efficiency is as a housing characteristic, respondents were asked to rank from a list of typical housing characteristics what they consider to be the most important factors to buyers (or renters) in their purchasing (renting) decisions. As outlined in Exhibit 9, not surprisingly, price/rent was ranked as most important, with location next. However, low energy efficiency was ranked surprisingly low given how this can significantly increase the comfort of a home by being warmer, dryer, and easier to heat and cool, while also saving on utility costs.

Under “other,” respondents included attached locked garage, good weather for retirement, and crime rate. In terms of number of bedrooms, respondents listed between two to four were most preferred, and more than one bathroom (ranging from 1.5 to 2.5). In terms of floor areas, where respondents specified this, over
Exhibit 8 | Information Sources

<table>
<thead>
<tr>
<th>Answer</th>
<th>Response Number</th>
<th>Response %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utility company</td>
<td>17</td>
<td>68</td>
</tr>
<tr>
<td>Local county or district</td>
<td>12</td>
<td>48</td>
</tr>
<tr>
<td>Federal government website</td>
<td>12</td>
<td>48</td>
</tr>
<tr>
<td>REALTOR.com</td>
<td>7</td>
<td>28</td>
</tr>
<tr>
<td>U.S. Green Building Council</td>
<td>6</td>
<td>24</td>
</tr>
<tr>
<td>Brochure delivered via mail or email</td>
<td>6</td>
<td>24</td>
</tr>
<tr>
<td>Independent website</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>Another realtor</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>12</td>
</tr>
</tbody>
</table>

1,500 sq. ft. was the most common response with the range of the desired house size being between 1,500 and 2,500 sq. ft.

Benefits Incorporating Sustainable Features into a Home

Respondents were asked what they consider, from a home-buyers perspective, are the most important benefits of sustainable features. Exhibit 10 indicates that reduced home running costs was considered the most important benefit, followed by increased property value, and reduced maintenance costs was ranked third. Further comments from respondents included that these items are very important to over 55 year olds and indoor air quality particularly relevant for people with allergies or those who with asthma or respiratory issues.

Accepted Additional Cost for Incorporating Energy / Water Saving Features

Respondents were asked for their perceptions of what homebuyers would consider to be an acceptable level of additional cost for incorporating energy/water savings features into a home. Just over a quarter (26%) felt that consumers would be willing to pay 6%–10% more, and 25% felt they would be willing to pay 1%–5% more. A quarter of respondents felt that consumers would not pay any more for these features, and 18% were not sure.

Energy- and Water-Efficient Features Demanded by Homebuyers and Renters

Respondents were asked what energy- and water-efficient products or sustainable building design features are buyers and renters asking for in the marketplace. The most commonly listed feature by respondents was dual-paned windows, followed by tankless hot water. Insulation and solar hot water heating were listed next most
frequently by an equal number of respondents. Energy-efficient appliances and air-conditioning were listed less frequently and only two respondents listed the following: energy efficient lighting, attic fans, low flush toilets, and ceiling fans. Some respondents claimed that no green features are being asked about, with a couple mentioning that buyers are most worried about cost. Another respondent said that demand for green features depends on price, with buyers of homes over $550,000 wanting these features and buyers of low-cost homes not been concerned, but are just hopeful the home already has insulation. Another respondent said that most of their sales are of investment properties and that these owners just want to do the minimum (fresh paint, clean carpets, etc.) and are not concerned about sustainable features. These responses indicate that the type of home, price range, and type of buyer are all relevant as to how important green features are to buyers.

**Information about Green Ratings Realtors Communicate to Clients**

We asked respondents if they are informing buyers about the green rating of a home, if it has one, with just over half (51%) saying they do, and 39% saying they may in the future, with the remaining 10% saying that they do not. It would be interesting to know the reasons why more respondents do not share this information, but may be due to their lack of experience with such homes given the low number of green-rated homes, particularly for existing stock. ENERGY STAR rated homes, which has the majority of green-rated homes in California, compared to LEED for Homes and GreenPoint rates homes, still has only 10%–19% of the market share (EPA, 2012).

**Barriers to Incorporating Sustainable Features and Suggestions to Improve Uptake**

Respondents were directed to rank a list of potential barriers to the incorporation of sustainable features into homes, from 1 most important to 9, least important. A summary of the results are outlined in Exhibit 11.
Respondents felt that the high cost/low benefit of features was the main barrier, followed by unwillingness to pay additional costs. It appears from the results to the last two questions that respondents and their clients are cost-focused but that this may be more perception than reality given that the literature indicates negligible cost premiums for incorporating sustainable features in buildings. Other comments respondents made include high cost, long payback period, not enough qualified people to install the technology or they do not install it correctly, and poor access to financing. Developers are more interested in providing homes that are affordable and sell.

**Improving Uptake of Energy/Water Saving Features in Designs of Homes**

Respondents were asked to rank items that they think would improve the uptake and incorporation of energy or water saving features into the design of new and
Bond

Exhibit 12 | Improving Uptake of Sustainable Features

<table>
<thead>
<tr>
<th>Rank</th>
<th>Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>More rebates / subsidies</td>
</tr>
<tr>
<td>2</td>
<td>Building code changes</td>
</tr>
<tr>
<td>3</td>
<td>Better advertising of housing sustainability</td>
</tr>
<tr>
<td>4</td>
<td>Availability of products</td>
</tr>
<tr>
<td>5</td>
<td>Changes to legislation</td>
</tr>
<tr>
<td>6</td>
<td>Building certification</td>
</tr>
<tr>
<td>7</td>
<td>Mandatory disclosure</td>
</tr>
<tr>
<td>8</td>
<td>Other</td>
</tr>
</tbody>
</table>

The three most important features that respondents felt would help, in decreasing order of importance, were more rebates and subsidies, building code changes, and better advertising of housing sustainability. The preference shown for more rebates and subsidies is consistent with the feedback from the previous question, which indicated that high cost/low benefit of features and unwillingness to pay additional cost were the primary barriers for incorporating sustainable features. Exhibit 12 outlines these results.

Perceived Impacts of Mandatory Disclosure

Interestingly, the mandatory disclosure of energy performance of the building was not ranked highly in the above question. Focusing on mandatory reporting, the next question asked respondents to indicate whether they thought that, if mandatory reporting of the energy performance of homes via energy audits or ratings is introduced would their clients be willing to pay more for a home with a higher HERS, LEED, GreenPoint Rated, or ENERGY STAR rating that indicates a property has a superior energy performance. Only a quarter said yes to this question, over half (52%) were unsure, and the remaining 23% said that did not think their clients would pay more.

The next question asked respondents that if the reporting of the energy performance of homes becomes mandatory, what they think the impact would be on existing home values in their market, with 44% responding that it would reduce their value. Given that existing homes may be older, less efficient stock, the response is not surprising. Over a quarter (27%) of the respondents were not sure what impact it would have, 17% said it would make no difference, and 11% said it would likely increase their value.

Further Comments

Respondents were invited to make additional comments. These highlighted some of the issues that dissuades buyers from considering a home with sustainable
features or that are more energy efficient, with many relating to the perception of high additional cost and long payback periods. Some respondents felt that people should have free choice, and that any energy saving devices or greening of homes should be voluntary and not mandatory. Typical comments included: “This would be an expensive proposition people cannot afford”; “The concern is that the state will mandate that homes be retrofitted with all kinds of energy-efficient items. If this happens, a large percentage of properties will lose value and will be difficult to sell.” Conversely, a respondent stated that all counties and cities must adopt a standard green code for permitting for new and renovated homes. “The market will begin to adopt a new baseline and the idea we call green or sustainable will become normal.” Optimistically, one respondent feels that the younger generation will demand more sustainable, energy-efficient homes to ensure the continuation of a healthy environment.

Research Limitations

Due to the very low response rate in Florida for the initial survey, a second attempt was made to survey realtors in California. Although the response rate was higher, it was still relatively low given the sample size of 5,000 CAR members. Therefore, the respondents surveyed may not be representative of the Californian realtor population.

Conclusion

This paper outlines the results of an online survey of California realtors’ perceptions towards energy-efficient “green” housing and how sustainable housing is perceived by buyers. As realtors play a major role in informing and educating buyers and sellers when purchasing a home, they are considered to be an important stakeholder group within the residential housing market that can enable behavioral change.

Despite the low response rate, the results are informative. The majority of respondents have either the NAR or the CAR designation and nearly half have over ten years’ experience selling real estate. Over two-thirds of them were either highly or moderately motivated to reduce their own impact on the environment. While nearly three-quarters of respondents consider the energy efficiency or water rating of appliances before purchasing any item, a number said this is not their main consideration: reliability, quality, brand, style, and price are.

Few realtors had experienced demand from buyers/renters looking for a home with sustainability features/improvements. The majority of respondents consider good insulation to be the most important feature contributing to a more sustainable home, yet the green features buyers most commonly ask them about are dual-pane windows and tankless hot water, followed by insulation and solar hot water heating. The most important benefits of sustainable features from the home buyer’s perspective is reduced home running costs and increased property value.

Respondents ranked the main barriers to the incorporation of sustainable features into homes to be the high costs/low benefits of features, followed by unwillingness
to pay the additional cost, and poor access to information. Indeed, it seems the perception of high cost may relate more to poor information, as in reality, as shown in the literature, the cost of including sustainable features can be minimal.

The most important things that might improve the uptake and incorporation of energy or water saving features into the design of new homes and retrofitting of existing homes identified by respondents were more subsidies and rebates, changes to building codes, and better advertising of housing sustainability. The latter could be aided by including relevant data and fields on the Multiple Listing Service (MLS).

As outlined in a report by the United Nations Environment Programme Sustainable Construction and Building Initiative (2007), the right mix of appropriate government regulation, greater use of energy saving technologies, and behavioral change can substantially reduce CO$_2$ emissions from the building sector. To aid this, realtors could play a key role in providing information to consumers to improve their understanding of energy efficiency, address misconceptions (particularly those relating to cost of incorporating sustainable features into a home), and reframe perceptions of energy efficiency to something measurable, affordable, and financially and environmentally beneficial. However, to do this, they too need education about sustainability measures and products to ensure they provide meaningful, accurate, and relevant information to their clients to help them prepare for changes towards a low-carbon future. Further, ongoing training of realtors to keep them up-to-date on the latest research relating to the costs, benefits, and payback periods of green features would aid this.

**Endnotes**


3. The words REALTORS and realtor/s will be used interchangeably, but mean those real estate professionals who are members of the NAR.

4. The Green RESource Council was founded to make the knowledge of green real estate practices available by providing sustainable education to real estate agents. They award students who successfully complete the program requirements with NAR’s Green Designation.

**References**


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