

WORKING P A P E R

The Role of Energy Efficiency in Homebuying Decisions

Results of Initial Focus Group Discussions

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INFRASTRUCTURE, SAFETY, AND ENVIRONMENT

Preface

Various government agencies, advocacy groups, researchers, and homebuilders have struggled to understand what role, if any, energy efficiency plays in home-purchase decisions, and how to make energy-efficient homes more attractive to consumers. There are many reasons why homeowners buy the homes that they do; location, quality, price, amenities, and other factors play into those decisions. Historically, energy efficiency is believed only to have played a small role in particular home-purchase decisions.

This report summarizes results of a “natural experiment” that describes views of homeowners who live in an unusual arrangement of new homes in a residential tract outside of Sacramento, California. Homes in this tract are comparable in most respects except that they have substantially different levels of energy efficiency. In a series of focus group discussions, views of these homeowners regarding their purchase decisions were collected, and subsequently analyzed.

Given the limitations of the research approach, the small sample size and issues of selection bias, the results presented in this Working Paper should be considered as preliminary and are intended to invite comment and discussion among the energy-efficiency research community with the goal of better understanding the issues surrounding homebuying decisions.

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(<http://www.rand.org/ise/environ>). Inquiries about EEED projects should be sent to the Program Director (ise_eeed@rand.org).

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Summary

Various government agencies, advocacy groups, researchers, and homebuilders have struggled to understand what role, if any, energy efficiency plays in home-purchase decisions, and how to make energy-efficient homes more attractive to consumers.

Overview

In 2004–05, Premier Homes and Cresleigh Homes built and sold 95 and 98 new homes, respectively, on a shared tract of land outside Sacramento, California. Most homeowners were able to choose from comparable homes from either builder. The two groups of homes themselves differ most in their levels of energy efficiency.

Both homes have several energy-efficient modifications, including denser insulation, low-emissivity windows, etc. Importantly, the Premier homes have rooftop solar panels and tankless water heaters, while the Cresleigh homes do not. The Cresleigh homes were certified by the local utility, the Sacramento Municipal Utility District (SMUD) as performing approximately 30 percent more efficiently to cool than homes built to California’s “Title 24” energy standard. The Premier homes were certified to perform 60 percent more efficiently than homes built to California’s Title 24 energy standard. The Premier homes are also considered “Zero Energy Homes” (ZEH), according to the U.S. Department of Energy’s Building America program. In this report, we identify Premier Homes products as ZEH homes, their owners in our sample as ZEH homeowners, Cresleigh Homes as non-ZEH homes and their owners as non-ZEH homeowners.

In a series of focus group discussions with owners of these homes conducted in October 2005, we gathered information on how these two groups of homeowners made their recent purchase decisions, the influence of builders and others on their decision, and the role energy efficiency has played in their homeownership experience more broadly. In our analysis, we explored potential differences in the ZEH and non-ZEH homeowners’ preferences at the time of their purchases, and what may account for these differences. Because variability in decision factors other than energy efficiency have been minimized in this arrangement of homes, we regard differences among statements of homeowners in these two

groups to yield potentially important insights into how consumers considered energy efficiency among many other considerations.

Study Area and Sample

The 193 homes in our study area (95 and 98 homes, respectively, in ZEH and non-ZEH home developments in the shared tract) share the same streets and are served by the same amenities in the surrounding community. The homes appear to be relatively more affordable by comparison to the rest of the state, yet more expensive, on average, than those in the surrounding areas. Participants in our study included 24 ZEH homeowners and 6 non-ZEH homeowners, together representing 16 percent of all households in the study area. Participants were recruited through mailings to all homes in the tract and screened by phone to verify their eligibility to participate in our study.

The homeowners in our sample were well-educated and relatively high income-earners. ZEH homeowners reported owning more homes in the past, having higher educational attainment, and engaging in a more thorough and discerning search for a home than did non-ZEH homeowners. Non-ZEH homeowners in our sample reported earning higher incomes and having larger households to satisfy.

Findings

Given the limitations of the research approach, the results presented in this Working Paper should be considered as preliminary. Among concerns for our approach are the small sample size and self-selection of our sample, the reliability issues of post-decision interviewing, whether homeowners in our study area represent homeowners in other communities, and whether our interpretation of their views represent energy-efficiency considerations more broadly. Nonetheless, our findings in many ways corroborate evidence reported elsewhere in the literature. Moreover, they indicate promising new lines of inquiry and hypotheses that can be more rigorously tested in further research efforts. This report is intended to share preliminary findings, invite comment and discussion among the energy-efficiency research community, and continue progress made on better understanding the issues surrounding homebuying decisions.

Considerations in Home Purchase Decisions

Homebuyers in our sample engaged in a complicated decision process involving lifestyle considerations, real estate market pressures, and financing and timing constraints, as well as different preferences for energy cost savings and comfort amenities. Where these values appeared to separate most clearly among ZEH and non-ZEH homeowners was in an apparent trade-off between potential energy savings and floor area of available homes.

The Builder's Role in Home Purchase Decisions

According to the participants in our discussions, energy-efficiency information was relatively incoherent in its presentation by builders' sales staff to homeowners before the sale. While materials that described the energy-efficiency merits of these homes (e.g., potential for energy cost savings) were available from the utility, this information was seldom presented in a manner that may have influenced the purchase decisions. The potential for energy-efficiency considerations to influence the decisions appeared to depend largely on homeowners' prior knowledge regarding energy efficiency, which in the case of the non-ZEH homeowners in our sample appeared to be less than that of ZEH homeowners.

Homeownership Experience and Energy Efficiency

The experiences in their current and past homes varied among the ZEH and non-ZEH homeowners in our sample. For all homeowners in our sample, home size mattered and more was generally preferred, just as national surveys report. But to ZEH homeowners, energy efficiency appears to have mattered more at the time of their recent purchases. The preference for energy efficiency among ZEH homeowners appears to be associated with relatively greater awareness of its value, despite an apparent lack of effort by the builder to promote this feature.

While the decision to purchase a larger non-ZEH home may be associated with higher income and larger households, awareness of the value of energy efficiency in non-ZEH homeowners appeared to have grown over the past year of homeownership, having been associated with paying energy bills and communications with ZEH homeowner neighbors whose bills are substantially lower.

Options for Further Research

Homebuying decisions are complex. Research on homebuyer response to Zero Energy Homes is limited. Encouraging consumer demand for energy efficiency remains a challenge. Further research is needed and our findings suggest at least three promising lines of inquiry: (1) mixed-method approaches to understanding consumer valuation of energy efficiency in home purchase decisions; (2) exploring “comfort” and “quality” associations with energy efficiency for their marketing potential; and (3) investigating the impact of neighborhood design on homeowner’s attitudes toward energy efficiency of their homes, and future home purchases.

Research on Homebuyer Decisionmaking

We recommend further research efforts that employ interviews with builders, focus group discussions with homeowners, and also survey and econometric methods, together to triangulate information on homebuyer decisionmaking. A systematic, qualitative approach that considers decisions in “story-based” terms, in combination with consumer surveys that assess more rigorously the various decision elements along with econometric analyses that validate them in the actual purchases, may better inform our understanding of complex consumer preferences. Open questions remain:

- How do homebuyers value energy efficiency among myriad other considerations when purchasing a home?
- Under what conditions does the value of energy efficiency increase in relation to other decision elements, and reveal itself in actual purchase decisions?
- Can a more persuasive “story” motivate consumer demand for energy efficiency?

Research on Marketing Energy Efficiency

Saving money on energy use appeals to homeowners, yet convincing homeowners to pay up-front for savings in the future remains a tough sell. In other words, home features that promise “comfort” or “quality” often have greater appeal to homebuyers than features that promise “energy efficiency.” However, builders and homeowners name several amenities that serve multiple purposes including energy efficiency (e.g., multi-zone HVAC systems that better moderate temperatures, trellises and gazebos that can support solar panels, and

low-emissivity windows that protect furnishings from sun damage). The potential for cross-selling energy-efficient “options” according to their promise of comfort and quality remains open. To this end, further research can address the following questions:

- What are the comfort and quality dimensions of various energy-efficient home features?
- What are proven strategies for marketing these energy-efficient features, according to their comfort and quality dimensions?
- What have we learned from the Energy Star labeling program experience for appliances that is relevant to new home construction and sales?

In addition, builders are required to initiate homeowner associations in new subdivisions. Yet the potential for builders and utilities to incorporate rewards for energy-efficient behaviors into more formal agreements (i.e., through covenants, codes, and restrictions) appears to be untapped. Local utilities might be involved, for example, in rewarding neighborhood communities that committed to certain energy-efficiency innovations. Potential homebuyers might find such neighborhoods attractive. Open questions remain:

- How might builders and utilities coordinate interests through the development of homeowner associations?
- How might homebuyers respond to such programs?

Research on Energy Awareness in Neighborhoods

Our findings suggest that interactions among neighbors may have special relevance for encouraging preferences for energy efficiency. The mix of ZEH and non-ZEH homes in our study area may be related to the growing awareness in the non-ZEH homeowners. If this is the case, neighborhood design that incorporates this may achieve greater energy awareness in the long term, increase demand for energy efficiency in future markets for new homes, and have important implications for builders’ strategy as well.

This line of inquiry may have important implications for the recently piloted Leadership in Energy and Environmental Design program’s Neighborhood Development (LEED-ND) rating system.¹ Open research questions remain:

¹ In partnership with the Congress for the New Urbanism and the Natural Resources Defense Council, the U.S. Green Building Council is currently piloting its LEED-ND rating system, which concerns itself with standards for environmentally sustainable building and neighborhood design.

- Does energy awareness increase through informal, socially mediated neighborhood processes?
- Does heightened energy awareness translate into energy-efficient home purchases?
- How might neighborhood design facilitate greater energy awareness?

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While the content of this report reflects the observations and opinions of the study participants, the authors accept responsibility for the ways those views have been represented.

1. Introduction

The energy-efficiency research community has struggled to understand what role, if any, energy efficiency plays in home-purchase decisions, and how to make energy-efficient homes more attractive to consumers. There are many reasons why homeowners buy the homes that they do; location, quality, price, amenities, and other factors play into those decisions. In the past, energy efficiency is believed only to have played a small role in particular home-purchase decisions. This study seeks to better understand why this may be and to explore the possibility that, in some instances, this may not be the case.

Outside of Sacramento, California, side-by-side housing developments were built in 2004–05 by Premier Homes and Cresleigh Homes on a shared tract of land. “Premier Gardens” and “Cresleigh Rosewood” include 95 and 98 homes, respectively, in each development. Homes in this tract share the same streets and are served by the same amenities in the surrounding community, including schools. While sizes and prices varied among the several floor plans offered by both builders, collectively the Premier Homes differed most from the Cresleigh Homes in their levels of energy efficiency.

The Cresleigh Homes products were certified by the local utility, the Sacramento Municipal Utility District (SMUD), as “Advantage Homes” at the “Gold” level.² This rating translates to an estimated 30 percent improvement in performance over conventional homes built to California’s “Title 24” cooling energy standard. The Premier Homes products include some additional features over the Cresleigh Homes products: (1) a tankless water heater which heats and delivers water on-demand, (2) all-fluorescent lighting, (3) denser ceiling insulation and more efficient air-conditioning³, and (2) rooftop solar panels that produce

² The Advantage Home program provides financial incentives to production homebuilders for constructing homes that significantly exceed California’s Title 24 Building Energy Standard cooling requirements. Meeting these requirements requires several modifications, including higher insulation levels, tighter heating and cooling duct systems, upgraded appliances, and others. Homes that have met Advantage Home requirements also qualify for the “Energy Star Home” rating according to the Energy Star Home Energy Rating System (HERS) designed by the U.S. Department of Energy and U.S. Environmental Protection Agency.

³ In the Premier Homes, ceiling insulation is rated at R-38 and air-conditioning systems are rated at 14 SEER (Pers. Comm., Rob Hammon, Consol.) By contrast, ceiling insulation in the Cresleigh Homes is rated at R-30 and air conditioning system are rated at 10 SEER. SEER is a unit of energy efficiency performance called “Seasonal Energy Efficiency Rating.” R-values indicate resistance a material has to heat flow. Higher R-values indicate greater insulating capabilities.

electricity that is returned to the utility grid, thus generating a credit against the household's utility bill. The Premier Homes products were certified as "Solar Advantage Homes," and are also described as "Zero Energy Homes" by the U.S. Department of Energy's Building America program. This rating translates to a 60 percent improvement in cooling performance over homes built to California's "Title 24" energy standard. In this report, we identify Premier Homes products as Zero Energy Homes (ZEH), their owners in our sample as ZEH homeowners, Cresleigh Homes products as non-ZEH homes and their owners as non-ZEH homeowners.

Recognizing this unusual "natural experiment,"⁴ we hoped to tease-out subtle explanations for the homeowners' preferences for energy efficiency in these two groups of homes at the time of their purchases, and what may account for these differences. In a series of focus group discussions, we gathered information on how these two groups of homeowners considered energy efficiency in their purchase decisions, the influence of builders and others on their decisions, and the role energy efficiency has played in their homeownership experiences more broadly.

What Homebuyers Want

In a 2000 survey of 40,000 households across the United States, the National Association of Homebuilders (NAHB) reported that homebuyers want larger homes with ample interior space and amenities. Only 24 percent of homebuyers were willing to compromise on size in order to reduce price (NAHB, 2002). This, of course, is consistent with a well-known trend in new home construction: The median new home size (measured as floor area) has increased by more than 50 percent since 1971 (U.S. Census Bureau, cited in NAHB, 2002), while household size has decreased by 17 percent in that same period (U.S. Census Bureau).

Moezzi and Diamond (2005) suggest that higher turnover in single-family houses and perceptions of resale value are important drivers of demand for homes that are larger than actual household needs. NAHB (2002) also reports that where homeowners might consider smaller homes, it would be in a trade for "higher quality products and amenities," not to hold down purchase price or to

⁴ A "natural experiment" is an instance of observable phenomena arranged in a manner that approximates a "scientific experiment." In a scientific experiment, variables can be described as "control" or "treatment", and when properly manipulated can explain cause and effect within the system. In a natural experiment, researchers do not manipulate treatment conditions, but instead attempt to collect data in such a way that the effects of variation in certain variables can be held approximately constant, and so that the effects of other variables can be discerned.

save on energy bills. In fact, while NAHB researchers reported in 1999 that 88 percent of consumers indicated that builders and developers should build more energy-efficient homes, fewer than half said that they would pay less than \$1,000 up-front to save \$1,000 in annual utility costs (NAHB, 2000). Cahners (2001) reports that homebuyers expect to recoup any investment in energy efficiency in three to four years; indeed NAHB (2001) reports that homebuyers are not at all interested in paying more than \$5,000 up-front to save \$1,000 every year thereafter. Together, this research suggests that consumers do not perceive energy efficiency as a worthwhile investment (by comparison to investing in a larger home with more amenities) if this investment will not pay returns in less than five years of living in their homes. Previously, we reported that builders assume that first-time buyers will stay in their current home for five to seven years, and “move-up” buyers will stay even longer (Hanson et al., 2004). If this is the case, the decision not to invest in energy-efficiency improvements is somewhat puzzling. According to Salant (2001), homebuyers often say that they want an energy-efficient home in one breath, and a host of energy-consuming comfort features in the next.

One might expect California homebuyers to behave differently than elsewhere in the United States in an effort to protect themselves against high utility bills, especially with the recent energy crisis fresh in their minds. But Californians are coping with another crisis: housing affordability. The California Department of Housing and Community Development reports that to meet 2020 projected housing needs, 220,000 units per year would need to be constructed from 1997 to 2020, a level that has rarely been achieved since 1970 in California and never sustained for more than two consecutive years. Through the 1990s, residential construction in California occurred at a rate of approximately 100,000 units per year; in 2005, residential construction was about 150,000 units. The result: the median-priced home is now out of reach for 85 percent of the state’s population.⁵ With housing prices especially high in the state’s largest urban areas,⁶ demand has created strong pressure to build new homes on less expensive land further

⁵ According to the California Association of Realtors, only 15 percent of California households statewide were able to afford a home in October 2005, down from 19 percent in 2004, and 23 percent in 2003. The minimum household income needed to purchase a median-priced home at \$538,770 in California in October 2005 was \$128,480, based on a typical 30-year, fixed-rate mortgage at 6.03 percent and assuming a 20 percent downpayment. By comparison, 48 percent of households across the United States were able to afford a new home in October 2005; the minimum household income needed to purchase a median-priced home at \$218,000 in the United States was \$51,990.

⁶ Historically, California’s largest urban areas have been limited to Los Angeles and San Francisco Bay areas, followed by San Diego and Sacramento. Residential space in “The Towers”, a 53-story condominium project being built in downtown Sacramento, is currently being sold for \$500 per square foot. \$500,000 for a 1,000 square foot studio apartment, until now, was unheard of in areas other than Los Angeles and San Francisco (Ortiz, 2006).

from city centers, and increasingly in California's inland valleys,⁷ where energy use especially for summertime cooling is greater. Despite the relatively greater importance of energy efficiency in these areas, its value appears not to weigh heavily in many home purchase decisions. This study seeks to understand a possible exception to this trend.

Quality, Comfort, and Energy Efficiency

Energy efficiency occupies an important, though blurred, area of consumer considerations in homebuying. The complexity of homebuyer preferences owes, in part, to the fact that real estate is both an investment and a place in which to live. Moezzi and Diamond (2005) suggest that mortgage and tax considerations, zoning, and other factors are also difficult to separate from what consumers want. We anticipate that the unique setting of our study allows us to assume that many potentially confounding factors are held constant, allowing us to focus on variation in what remains.

We previously characterized this complex of preferences in terms of dimensions of "quality," "comfort," and "energy efficiency" (Hanson et al., 2004). Consumer decisions likely vary across preferences for these, together and in combination, according individual perceptions, lifestyle needs, and investment strategies. There are inherent difficulties in measuring comfort and quality especially, despite their seeming familiarity, but consumers do make decisions with them in mind. Previously we reported that homebuyers are often attracted to those homebuilding companies that offer energy-efficient products, but given a choice, "wow" features such as kitchen countertop and flooring upgrades often trump energy-efficient features in the ultimate purchase decisions. We also reported that consumer interest in low-emissivity⁸ windows in some cases was not for their greater energy efficiency and promise of energy savings, but instead for their ability to better protect homeowners' curtains and furniture from sun damage.

In this study, we qualitatively probed preferences of homebuyers in our two groups of homeowners for insights into how comfort and quality considerations

⁷ According to the California Association of Realtors, the most affordable regions in the state in 2005 were the The High Desert, Sacramento, Central Valley, and Riverside/San Bernardino.

⁸ Low-emissivity windows reduce the loss of radiant heat from a home while still allowing visible light to pass through them, thus keeping warmer air inside during the winter and warmer air outside during the summer. These windows also filter ultraviolet light from the sun, which can otherwise harm indoor furnishings.

were considered alongside energy efficiency, and why homes of one level of energy efficiency were chosen over the other.

The Homebuilding Process, the Builder-Homebuyer Relationship, and the Homeownership Experience

Consumer preferences are intimately tied to the homebuilding process, and the role of the builder in a particular home purchase decision cannot be ignored. The following summarizes this process with special attention to the builder-customer relationship.

Larger homebuilding companies, including Premier Homes and Cresleigh Homes, often coordinate information, decisions, and actions at almost all stages of the homebuilding process. According to Hassell et al. (2003), this process is defined by the following stages, with each comprising several steps:

- *Land Development:* Acquisition, use planning and subdivision, rough grading, and infrastructure construction.
- *Design:* Floor plan, lot layout, basic specifications and options, and basic cost analysis.
- *Pre-construction:* Selection of homebuilder, selection of trade contractors, sequencing and scheduling, selecting and ordering materials.
- *Construction:* Excavation; foundation; structure; heating, ventilation, and air-conditioning (HVAC) systems; plumbing; electrical, etc.; finishing (interior and exterior); certificate of use and occupancy.
- *Post-construction:* Purchase by owner, financing and insurance, purchasing durables and consumables, operation and maintenance, warranty claims, and customer service.

The builder typically enters the process around the design and pre-construction stages. Although the homebuyer typically enters the process at the post-construction stage, consumer preferences identified through market research influence builder decisions and actions at earlier stages of the process, including design and pre-construction.

An important relationship develops at the post-construction stage in three ways: (1) builders' sales staff present information and custom options that the potential homebuyer selects from; (2) builders' customer service departments remain in contact with homebuyer over at least the first year of homeownership; (3)

builders' strategy seeks to maintain strong relationships with homebuyers in order to promote word-of-mouth advertising and often to sell current customers their next homes.

How the builder presents a home at time of sale likely influences the purchase decision. But perhaps more importantly, the owner's ongoing experience in the home likely affects preferences that will be revealed in subsequent purchase decisions. Our study seeks additional insight into the role energy efficiency plays in the builder-homeowner relationship, and how consumer preferences for energy efficiency evolve.

Approach

This study builds upon the work begun in a previous study (Hanson et al., 2004), in which the relationship among comfort, quality, and energy efficiency was explored. That study involved qualitative interviews with executives of several leading production homebuilding companies in California.

This study takes advantage of an instance of a "natural experiment" in side-by-side residential developments in a tract outside of Sacramento, California. This study involved a series of focus group discussions with homeowners in those developments.

A "Natural Experiment" in Residential Energy Efficiency

Our study area comprises a 193-home tract that was developed by two homebuilding companies in 2004–05. These companies offered 95 ZEH and 98 non-ZEH homes, respectively. The tract had a common entrance from adjacent streets and residents had access to the same goods and services of the surrounding community, including schools. Within the tract, ZEH and non-ZEH homes were often across the street from one another, in some cases next to one another on the same side of the street, and in other cases shared a backyard fence. Construction by each company proceeded simultaneously, and homebuyers often were able to choose from among the homes offered by each company.

The two companies' products differed most in their levels of energy efficiency, and to lesser degree in their floor plans, sizes (floor areas) and prices. Both companies offered custom options (e.g., flooring and countertop upgrades). The following discusses these characteristics and how they varied among the homes.

Energy Efficiency

Both ZEH and non-ZEH homes in the study area include several features that afford relatively greater energy efficiency than most homes in California, including denser insulation, foam-wrapped exteriors, low-emissivity windows, fluorescent lighting, advanced heating and cooling systems, and programmable thermostats. As described above, the ZEH homes included tankless water heaters and rooftop solar panels, fluorescent lighting and other energy efficient advantages over the non-ZEH homes. According to marketing materials available from the local utility,⁹ this difference translated to performance gains over conventional homes built to the state's "Title 24" energy code for cooling by approximately 30 percent in the case of the non-ZEH homes, and 60 percent in the case of the ZEH homes.

Floor Plans

Five standard ZEH homes were available, while seven non-ZEH homes were available. Each builder offered homes with two to four bedrooms, two to three baths, and one to two stories. ZEH homes had two- to four-car garages, while non-ZEH homes had two- to three-car garages. Standard floor plans for both home groups could be customized to some extent (e.g., adding an interior wall to create a shop in the garage or to create another bedroom or den.)

Floor Area

ZEH homes ranged in floor area from 1,285 to 2,248 square feet (sf), while non-ZEH homes were somewhat larger, *on average*, ranging from 1,610 to 2,442 sf. Differences in size were greatest in the case of owners of the smallest ZEH homes (1,285 sf) and the largest non-ZEH homes (2,442 sf), which together represent less than 10 percent of homes in the study area. In the remaining 90 percent of homes, homebuyers were free to choose among homes from either builder that varied in size from about 1,500 to 2,200 sf.

Price and Cost

Prices varied by product, custom options, and over the 2004–05 sales period, ranging from the mid-\$200,000s to the mid-\$400,000s. Except in the case of the smallest ZEH home and the largest non-ZEH home, there was substantial overlap of sales data from the two companies, in purchase date, purchase price, and size. Most homes were priced in the \$300,000s. Differences in prices likely reflected differences in size, custom options, and date. Cost of the home also

⁹ In this study area, the local utility was the Sacramento Municipal Utility District (SMUD).

depended on mortgage lending options available to the homebuyers at the time of their purchase.

Our natural experiment allows us to separate revealed preferences for homes with different levels of energy efficiency, and probe the various considerations and justifications therein. With the exception of the smallest ZEH home and largest non-ZEH home, homebuyers were free to choose among homes that were generally comparable with respect to floor area, size, price, and custom options. Both groups of homes were served by the same community amenities. How various decision factors varied among owners of homes with substantially different levels of energy efficiency were the themes of our discussions with homeowners.

Focus Group Discussions with Homeowners

Quantitative research methods are less suited to analysis of phenomena where scales of measure are several and difficult to specify, such as those inherent in homebuying decisions. Quantitative approaches are also predisposed to particular hypotheses, data, and measures that may not always be relevant to the construct of interest. By comparison, qualitative research is often suited to revealing information that is often difficult to measure, inseparable from its context, and is often highly subjective. Focus groups were first employed by Lazarsfeld and Merton in 1941 to gather military intelligence

...in exploring ways to generate new questions that could be used to develop new quantitative strategies or simply complement or annotate the more quantitative findings of their research. (Kamberelis and Dimitriadis, 2005)

There are several problems with focus group research. Among them, focus group research often suffers from the inherent subjectivity of the responses and interpretation of the results, along with the small sample sizes these methods typically employ.

Another potential concern with our approach is that we have interviewed homeowners after they made their purchase decisions. While the discussions were not held long after the decision,¹⁰ thus conditions were still fresh in our participants' minds, responses were likely subject to the influence of "cognitive dissonance." That is, participants are psychologically inclined to verbalize

¹⁰ Some participants had purchased their homes within a few months of our discussions. The longest purchase-interview period was about one year.

support of their decision (and less likely to verbalize disappointment with it) to avoid the emotional distress of having made the wrong decision. Market researchers typically interview prospective buyers in order to avoid this well-known effect.

These drawbacks call into question the reliability and validity of results reported in our study, on its own, and the extent to which conclusions can be generalized. On the other hand, there is evidence that stated preferences, particularly for energy efficiency, do not reveal themselves in actual decisions, thus interviewing prospective buyers has its own problems. Our study intends, as an initial step, to explore issues and identify hypotheses that can be more rigorously tested using other methods, just as Lazarsfeld and Merton did during World War II.

Sample Recruitment and Research Design

Focus group discussions with homeowners were held in October 2005. All homeowners in the 193-home tract were contacted by mail one month prior and two weeks prior to the scheduled discussions. The mailing consisted of a cover letter and flyer that generally indicated RAND's interest in better understanding why homeowners bought their current homes. The letter described an hour-long, catered meeting at a nearby hotel along with a \$100 cash incentive for participating in a group discussion. The U.S. Department of Energy was identified as the source of funding for this study. Recipients were asked to respond by phone to an assignment coordinator at RAND's Survey Research Group if they were interested in participating in a discussion.

Callers were screened to ensure that they were homeowners in the study area and that no two callers were from the same household. Participants were assigned to one of four groups according to the builder of their home (ZEH or non-ZEH) and according to their preference for attending either a weekday evening or weekend morning discussion.

At the scheduled times, participants were met at the hotel and invited into a meeting room where they were asked by a facilitator to fill out a pre-discussion questionnaire (Appendix 1). After completing the questionnaires, participants were engaged in an hour-long discussion that followed a semi-structured discussion protocol (Appendix 2). Discussions were moderated and recorded by the facilitator, and recordings were transcribed.

Method of Analysis

Transcripts were independently reviewed by the facilitator for accuracy and then by two researchers. General impressions and specific examples from the transcripts were discussed, interpreted, and reported by the researchers.

Results are presented in a manner that highlights the *strongest* statements and *clearest* differences regarding relevant issues. Strongest statements were those that were corroborated *within* homeowner groups, especially when participants from different discussion sessions made similar statements. Clearest differences were those positions that differed most *between* homeowner groups on a particular issue.

In this report, statements are not attributed to individuals or companies, and this intent was made clear to participants in an effort to elicit candid responses.

2. Results

In this section, we first describe our sample according to responses recorded on the pre-discussion questionnaire, followed by results of the focus group discussions.

Overview of the Sample

The overall participation rate for all households in the subdivision was 16 percent, with participants heavily favoring ZEH homeowners: 24 ZEH homeowners and eight non-ZEH homeowners responded and signed up to participate in the study; two non-ZEH homeowners did not show-up for the discussions.

Focus group attendance during weeknight sessions was 11 and two for ZEH and non-ZEH homeowners, respectively. Nearly all ZEH homeowners were also joined by their spouses during the weeknight focus group session.¹¹ Focus group attendance at the weekend sessions was 13 and six for ZEH and non-ZEH homeowners, respectively.

The following reports some potentially useful comparisons of data collected from our pre-discussion questionnaires to aid our interpretation of the focus group discussion results. Comparisons are made between ZEH and non-ZEH groups in our sample, and also to 2000 Census data describing the surrounding areas (i.e., Sacramento city, Sacramento County, Rancho Cordova, and the 95827 zip code area).

- The number of persons living in non-ZEH homes exceeded that of ZEH homes (3.50 persons per household compared with 2.88; in California, 2.87 persons on average occupied a household in 2000). This difference appears to be accounted for by a greater number of children, on average in our sample, in the non-ZEH homes.

¹¹ It is unclear why this happened. Spouses were not invited to the discussions nor offered additional incentives when they appeared. They were not counted in our sample, nor were additional questionnaires collected from them, but they were not turned-away from the meeting. While discussion mostly involved a single voice from each household, it is possible that some instances of agreement reflected within-household views rather than between-household views in the Premier group discussions. The result is that our interpretation of the strength of statements made by ZEH homeowners may have been overstated in our findings.

- Household incomes for all households in our sample were about twice the median household incomes reported for surrounding areas in 2000. Non-ZEH households tended to have a greater proportion of income-earners, some with two or three householders working full-time. Generally, household income of non-ZEH homeowner participants exceeded that of ZEH homeowner participants by about \$10,000–40,000.
- Nearly all homeowners in our sample had previously owned homes—usually more than one, and more on average for ZEH homeowners.
- Most homeowners in our sample were between 25 and 44 years old, with a greater share of younger homeowners in the ZEH group.
- The share of male participants in the ZEH groups was about twice that of the non-ZEH group.
- About three-quarters of homeowners in our sample were white—slightly less than that (71 percent) in the ZEH homeowner group but slightly more (83 percent) in the non-ZEH homeowner group. These shares exceeded those observed for Sacramento County (64 percent white) and California (60 percent white) in 2000.
- Almost all participants had attended at least some college; more than half had undergraduate degrees. By comparison, in Sacramento County and California more generally, about 25 percent of people had bachelor's degrees or higher in 2000. ZEH homeowners in our sample were twice as likely to have advanced degrees (master's or higher) as non-ZEH homeowners.
- Appliance use by homeowners in our sample was similar, with the exception that some ZEH homeowners had pools (8 percent of all ZEH homeowners in the sample), and non-ZEH homeowners were more likely to have a second refrigerator in their garages (75 percent of non-ZEH homeowners versus 50 percent of ZEH homeowners).
- There was substantial overlap in price and purchase dates reported between ZEH and non-ZEH homeowner groups. Most homes were purchased between summer 2004 and fall 2005. Purchase prices of non-ZEH were slightly higher, on average, than ZEH homes in our sample. Two participants lived in the smallest ZEH home product, and two participants lived in the largest non-ZEH home product.

- Homes of our participants were about \$100,000 below the median home price in California, but were generally about \$25,000–75,000 above the median prices in surrounding areas.
- ZEH homeowners, collectively, had researched 16 other residential areas before purchasing their homes. Non-ZEH homeowners, collectively had researched less than half as many other areas.

In all, homes in our study area were priced lower than the median home price in California, but higher than the median home price in surrounding areas, thus appear to be targeted at experienced homebuyers (i.e., not first-time homebuyers). Based on information they provided, homeowners in our sample had higher education attainment and higher incomes than the median incomes for surrounding areas. By comparison to non-ZEH homeowners in our sample, ZEH homeowners reported being more experienced in homeownership and portrayed themselves as better educated and more thorough and discerning in their search for a home, despite their younger age. Non-ZEH homeowners in our sample reported earning higher incomes and having larger households to support.

Results of the Focus Group Discussions

Results of the various focus group discussions are described in terms of three broad themes: (1) the various factors that influenced the current homebuying decision, (2) the influence of builders and others on the current homebuying decision, and (3) the influence of the previous homeownership experience on the current homebuying decision, and potentially the influence of current experiences on the next homebuying decision.

Within each of these themes, we report a comparison of viewpoints of ZEH and non-ZEH homeowners, followed by more detailed reports on ZEH homeowner views and non-ZEH homeowner views.

The Grand Calculus of the Homebuying Decision

Various factors were cited in cases where ZEH homes were chosen over non-ZEH homes, and vice versa: Location in the development, timing of mortgage approval, and various specific aesthetic and layout preferences favoring one product over the other were prominent among these. Each of these occasionally became *deciding* factors for both ZEH and non-ZEH homeowners, depending on individual circumstances. A deciding factor that was unique among non-ZEH

homeowners in their decision against purchasing ZEH homes was the larger size of the bedrooms in the non-ZEH product. By comparison, a deciding factor that was unique among ZEH homeowners who considered non-ZEH products was the ZEH “energy package” and its promise of energy savings.

According to one non-ZEH homeowner who had considered both ZEH and non-ZEH homes, home size and layout were identified as important, but size mattered most in the ultimate decision:

We really wanted to get one of the [ZEH] because we like the layout the best. It was ranch style as opposed to two-story. And we went to look at it once we were selected for one of the homes, and the [ZEH] bedrooms were just so tiny we backed out. And we decided, all right, well, we really like the [non-ZEH home], the size of the bedrooms, just a lot more usable. And so we opted even to take the two-story, which we really didn't want, over the tiny bedrooms of the [ZEH].

Similarly, another participant noted the smaller size of the ZEH bedrooms along with the staircase design as deciding factors to purchase a non-ZEH home, despite preferring the ZEH home's kitchen:

We also went to [the ZEH development]. I like their kitchen, the way they have their kitchen, I loved it. The only reason we backed out, when you see the stairs...it's not private. [The stairs are] pretty open. And then their bedrooms were too small.

On the other hand, for at least two ZEH homeowner participants, the “energy package” was cited as their deciding factor. In the words of one of these homeowners,

We knew right away, the location's pretty good. I was driving over there, I drove in, I saw the houses. I love the construction, I love that they're very well put-together. And then, when you compare the energy savings across time, there was no question where to buy.

These two ZEH homeowners had turned down opportunities to purchase non-ZEH homes opting instead to wait for a ZEH home, even at a time when non-ZEH homes were priced “a lot cheaper.” According to the other homeowner in this pair,

[The non-ZEH builder] called us first, but we kind of thought, okay, we're going to wait and hope that [the ZEH builder] calls so that we could get in on the [Zero] Energy [Home] because we were placing that as a big factor on being able to save.

It is important to note that purchase prices for both ZEH and non-ZEH homes varied across period the development was being sold, and according to the various home products offered. In at least one instance, however, price per

square foot, was believed to be comparable among available ZEH and non-ZEH home products. As described by one ZEH homeowner:

Anyway, for us, I thought it was the same price per square foot. It was exactly the same price as what we would pay for [the non-ZEH home]. Their models were a little bit bigger and so it looked a little more expensive on [the non-ZEH home], but per square foot it was exactly the same.

In one case, a ZEH homeowner had carefully researched the area and compared non-ZEH and ZEH products before making a decision. In the end, the value of the ZEH energy package along with the influence of the builder appears to have played an important role in making the final decision, overturning important aesthetic criteria that were previously “weighed very heavily”:

So we actually looked at models up in [various Sacramento-area locations]...we spent about a year trying to decide actually which builder we wanted. We wanted to be in this area...price was not a factor...it just kept going up. We had sat there and waited because we were comparing [the non-ZEH and ZEH home products]. We were saying the floor plan was really important because we wanted to have immense rooms for our kids and each other, and we were going to have an office, and we wanted to have all the bedrooms upstairs and all the living area downstairs, and have the kids downstairs. And so the floor plan was important. And then in terms of things we weighed very heavily — one was the floor plan and then one was the appearance, the entryway. And those were our biggest factors and, really, we did not like the [ZEH] entryway. We didn't like the way the staircase looked, we didn't like a lot of the outside parts of it, but the floor plan was good. And then we learned about the energy efficiency stuff and then we learned more from the builder... And then we thought what the first releases were going to be, and that was sort of good timing for us.

ZEH Homeowner Viewpoints on the Decision

When asked which factors influenced their decision to buy their current home, most ZEH homeowners cited location of the development within the greater community, floor plan, and price of the home as important factors in the decision. Proximity to church and schools, family and friends, as well as access to highways and work in the Sacramento area were almost universally agreed to be the *most* important. Price was cited as important to some, but most others were more influenced by their perception of “value” at the given price.

Focusing specifically on the home, the notion of value reflected a range of considerations that were largely tied to interior features including the fireplace, high ceilings, “molded corners,” center island in the kitchen, granite countertops, kitchen cabinetry, and “just the whole appearance.” Others touted the quality of

overall construction of the home, and exterior features such as the “50-year roof” and the built-in sprinkler system in the yard.

Without dissent, the energy efficiency features were perceived to confer substantial additional value on the home, owing both to the manner they have been incorporated into the construction (e.g., “the solar panel within the roof instead of above [it]”, HVAC, low-emissivity windows, and “better insulation”) and also the appliances included (e.g., tankless water heater and the various “top-of-the-line energy efficient [appliances]”). One participant suggested that, the energy-efficient features will make this home “very easy to [re]sell,” and another added “at profit.” In fact, several participants suggested that the “energy package” was the *deciding* factor in their buying a ZEH home. According to one participant,

Yeah, for us it was the energy package, first and foremost. And we were pretty much set on that. That was what made our decision easier.

To some extent, the value of energy efficiency was confounded by the preference for a new, more spacious home, which brings with it greater comfort, more reliability, and better understanding of “what you’re getting.” These last points were elaborated by one participant to mean that

when you buy an older home...for the same price, [you are] uncertain about the electrical, heating, what sort of things you might have to fix.

In the results subsection describing the influence of homeownership experience, we report how size and energy efficiency related in ZEH views.

Non-ZEH Homeowner Viewpoints on the Decision

As with ZEH homeowners, non-ZEH homeowners placed greatest weight on location of the development within the greater area in their decision, citing proximity to work and amenities of the surrounding community. Also important were the floor plan of the home, and the home being “new,” referring especially to the lower maintenance requirements that this implied. According to one non-ZEH homeowner,

Well, just to have a new home and not have to be fixing this, fixing that. I had a 25-, 30-year-old home, whatever it was. I had to repair the roof. That...is nice [not having to do that].

Others were swayed by the aesthetics of particular home amenities that were standard features. According to one participant, when asked what specific features of your home “influenced you the most”:

My granite countertops. They were included. But then they charged you for every other thing in the world, so it might have been cheaper to go with the other people and order the countertops. But [the granite countertops were] a nice feature. And the fencing in the front yard.

Some merely wanted to purchase a new home in the area, as soon as one became available, citing the urgency created by local real estate market conditions. For one participant, who considered both ZEH and non-ZEH products, it was simple:

They called us earlier at [the non-ZEH builder], and that's why we moved here.

Notable by its general absence in the discussions with non-ZEH homeowners were considerations of the energy performance characteristics of their home at the time they made their purchase decisions. The only participant that mentioned energy performance as a consideration, without prompting by the facilitator, ultimately gave greater weight to aesthetic considerations in the purchase decision:

We liked the [ZEH] homes. That's actually what we came over to look at. We were interested in the solar energy, but we were seduced by the beauty of the [non-ZEH] homes.

That same participant did place value on being within walking distance of a coffee shop and being able to bike to work, recognizing that "the price of gas [is] going 'whoosh!'"

In all, homeowners in our sample engaged in a complicated decision process involving lifestyle considerations, real estate market pressures, financing and timing constraints, and different preferences for energy cost savings and comfort amenities. Where these values appeared to separate most clearly among ZEH and non-ZEH homeowners was in an apparent trade-off between floor area and energy savings.

Influences of Builders and Others on the Purchase Decision

For all the homeowners that participated in our study, purchasing a new home involved searching for a community, finding a new development, interacting with builders' sales staff, putting names on waitlists, waiting for an availability, and selecting custom options, all while shopping for a mortgage and selling a previous home.

For many of the homeowners in our sample, consideration of energy efficiency did not occur before their decision was made. Given the ordeal described above,

this may not be surprising. Curiously, our discussions revealed that builders often provided detailed information regarding the energy-efficient features of their homes only *after* the purchase decision was made. According to some non-ZEH homeowners,

- Participant 1: I think they already had the buyers so they didn't need to sell.
- Participant 2: It was a seller's market, so they didn't have to do much selling.
- Participant 3: Right.

Adding to the ordeal faced by homeowners in our sample was the selection of custom options for their homes. Both ZEH and non-ZEH homeowners expressed some frustration when describing this experience, in terms of the number, availability, and cost of options, which apparently varied from \$500 (for a sink installed in a laundry room) to tens of thousands of dollars in upgrades for flooring, countertops, etc. According to two non-ZEH homeowners:

- Participant 1: Well, the prices were deceptive, too, because by the time you've added the upgrade...give me a break. I probably would have never looked at that price of a house.
- Participant 2: Yeah, we would have gone someplace else because we had almost \$40,000 in upgrades.

Several ZEH homeowners were similarly frustrated by their experience selecting custom options, some of which appeared not to be available during earlier phases, others of which appeared not to be available during later phases, and some of which were apparently limited to certain models. Others were unclear on what were upgrades and what were included as standard features. Others seemed to think availability depended on one's ability to haggle with sales staff. And there was general agreement on feeling "rushed" during the sale of custom options.

In all discussions, several features of their homes were described by homeowners as requiring further attention from the builders.¹² Many homeowners in our sample have been in contact with the builders regarding these issues.

¹² As reported previously, it is not unusual for homebuilders to receive complaints from new homeowners and to process their warranty claims. All major builders have customer service departments intended for this purpose. Builder strategy places great importance on customer satisfaction. We have no reason to believe homes owned by participants in our study experienced higher, or lower, incidence of construction defects in their homes.

ZEH Homeowner Viewpoints on the Influences of Builders and Others on the Decision

Three ZEH homeowner participants had notable professional experience – one as an engineer for a utility company, another as an energy auditor, and another as a building inspector. This experience appears to have contributed to greater awareness of the comparative value of the ZEH “energy package” and preconditioned the decision to purchase their ZEH home, apparently without much additional contact with, or need for additional information from, the ZEH builder’s sales staff.

Others cited various information on the energy features of their ZEH homes that were provided by the builder.

- Participant 1: I had a little handout. It had everything about the solar energy package.
- Participant 2: They also had the air conditioner on there, what type of air conditioner, all the low energy features, the extra insulation. That was all there. Insulation, windows...tankless water heater...I was in phase three so by the time I came in the displays were set up in the garage [of the model home].

Yet, several ZEH homeowners who made their purchase decision during the earlier phases of development had done so before the homes’ energy features were explained to them, as illustrated in the following:

- Participant 1: It was on faith. We bought before the displays. I got a brochure, I guess.
- Participant 2: A lot of us felt when we bought, we bought blind. We didn’t really have any idea what we were getting. We just prayed that it would all work out.

This last set of statements – buying “on faith” and buying “blind” – while not informed by years of experience studying energy issues or home construction or by the presentations of the builder’s sales staff appeared to embody an idea of energy efficiency that influenced their purchase decisions nonetheless.

Non-ZEH Homeowner Viewpoints on the Influences of Builders and Others on the Decision

When asked if they were given any information about the energy performance of their homes by the builder’s sales staff, non-ZEH homeowners responded variously:

- Participant 1: Yes, they told us we use all the latest and high-tech things such as dual pane windows and heating and air conditioning.
- Participant 2: No, not that I recall. That wasn't a big focus for me when I bought the house.
- Participant 3: No, they never disclosed any energy-efficiency information.
- Participant 4: We had some from the builder. Just on the insulation and the windows. [The local utility] sent us something saying that you are a...and they called it something. They gave it an award for and energy-efficient home. I don't remember what it was.
- Participant 1: Yeah, I remember that too. It had a special designation from [the utility] but I don't know what it was called. I remember they put a plastic coating on the outside of the house, like Saran Wrap almost, before they put on the stucco. I made a note of all that because our previous home was an energy hog and so I was looking for those features.
- Moderator: Did this information affect your decision to purchase your home?
- Participant 1: It helps. It's a much bigger house and our bills are about the same as our smaller house with a pool.
- Moderator: When you actually went to look at some models, did you talk at all about energy efficiency?
- Participant 2: No.
- Participant 3: No.
- Participant 4: No, they didn't in the sales office, not until we already agreed to purchase the house, and then in the walk-through they told us a lot, and the paper was from [the utility].

In all, it appears that builders in our study are enjoying the benefits of a seller's market in California and that energy-efficiency information is relatively incoherent in its presentation to homebuyers before the sale. The potential for energy-efficiency considerations to influence a purchase decision appears to depend largely on homeowners' prior knowledge, which in the case of the non-ZEH homeowners in our sample appeared to be less than that of ZEH homeowners.

The Influence of Homeownership Experience on Energy-Efficiency Considerations

The following results break from those previously reported in that they are not focused on the recent home purchase decision, but instead on the current homeownership experience and potential future decisions.

Because nearly all participants in both groups had previously owned homes and likely had experience paying high energy bills, especially during the recent energy crisis, one might expect that non-ZEH homeowners rationalized paying more for larger homes in a trade against potentially lower energy bills.

In fact, the size of the ZEH home appears to have threatened the preferences of ZEH homeowners as well, although not enough for them to decide in favor of purchasing a non-ZEH home. In hindsight, two ZEH homeowners confirm the observations of non-ZEH homeowners regarding the size of the living quarters:

Participant 1: [The] Family room's too small.

Participant 2: We thought so too.

It is not clear whether "too small" is an exaggeration to make a point in this statement, or whether these ZEH homeowners would have changed their decision given the option to do so (e.g., forgoing energy savings for larger family rooms), as this possibility was not probed further.¹³

On the other hand, after about one year of experience in their current homes, non-ZEH homeowners' level of appreciation for energy efficiency appeared to approach that of ZEH homeowners, if we compare examples of ZEH homeowners' satisfaction with their energy bills alongside non-ZEH homeowners' apparent dissatisfaction with theirs. When asked whether energy performance has become more or less important to them, two non-ZEH homeowners responded,

Participant 1: It's very important to me because we pay high bills. That's why we bought a new house. We bought a new house [expecting to pay lower bills]. I didn't realize it was going to cost this much to control the climate of a new home. Other people are saying, you know, I moved from an old house and the old house was better at energy efficiency than this new one. What's going on?

¹³ It is unlikely that pursuing this would yield reliable results, owing to the influence of "cognitive dissonance."

Participant 2: Yeah, I moved from my 29-year-old-house to this new house, and my bill like tripled [my bill at] that house.

Participant 1: I really wasn't paying attention to that aspect, but now that we see the bills, yeah, I'm paying attention to it.

Again, we did not probe further to understand whether these non-ZEH homeowners would have changed their decisions (trading their current home for a ZEH home, presumably with smaller living area) but these statements reveal growing concern among non-ZEH homeowners for their energy bills. The following gives a sense of the difference in amounts paid by homeowners in ZEH and non-ZEH groups, beginning with ZEH homeowners discussing energy bills for cooling their homes in summertime,

Participant 2: I probably pay the highest here, \$78.00.

Participant 1: Yeah, I'm sure you have the highest [among ZEH homeowners participating in this discussion].

By comparison, the following exchange among non-ZEH homeowners discusses summer energy bills:

Participant 1: Yeah, it can get high. In our July bill, it's still over \$200.

Participant 2: But, how many square feet is your house?

Participant 1: It's two-story, two-thousand... Yeah, so your July, you were able to keep it...

Participant 2: Well, it was like \$130.

Participant 1: Oh, that's not bad.

Participant 3: Gee, that's really good.

The fact that ZEH and non-ZEH homes exist side-by-side in the same development introduces another consideration: Neighbors talk to one another and they appear to talk about energy performance of their homes. While other explanations are also possible, the growing awareness described above for non-ZEH homeowners may have been heightened by neighborly discussions with ZEH homeowners about their energy bills. According to two ZEH homeowner participants,

Participant 1: I think once we've been in there for as long as we have, we really realize what a savings [a Zero Energy Home] is.

Participant 2: I talked to [various non-ZEH homeowners] about the energy bills and a couple [of them] have at least double. And [theirs is] equivalent to the same home or

much smaller than ours. When you think about it that way, our \$78.00 bill is totally great.

None of the non-ZEH homeowner participants described such a discussion with a ZEH homeowner, but from both ZEH homeowner discussion groups, it was made clear that information is being exchanged among neighbors regarding the energy performance of their homes. Energy awareness has grown in non-ZEH homeowner participants in our sample. Accompanying this greater awareness is (1) experience paying energy bills and (2) communications with ZEH homeowner neighbors, whose energy bills are substantially lower.

ZEH Homeowner Viewpoints on the Influence of Homeownership Experience on Energy Efficiency Considerations

According to ZEH homeowners, when asked whether home energy performance has become more or less important to them, and whether it will influence future home purchase decisions,

- Participant 1: It's become very real, very tangible, and absolutely cool. And would it affect my next home purchase? I would say that it would certainly be a factor that I would strongly consider, depending on what the cost implications are. If I'm going to pay for something that I'm not going to break even for 20 years, I don't know that I would do that.
- Participant 2: Would [energy performance] be a factor? Yes, definitely. I'm building a gazebo and I have even investigated adding additional [solar] panels to the roof...
- Participant 3: Definitely, if I buy another home.
- Participant 4: Yes, buying has changed the way I think about energy.
- Participant 5: Uh-huh. I don't pay a dime for my electric bill.
- Participant 6: Yes, I couldn't imagine moving [except to another] solar energy home.
- Participant 7: Yeah. The hot water heater would be the stuff I would look at [in a subsequent purchase]... I think the whole way everything was integrated together, that's definitely the way to do it.

The value of energy efficiency was considered differently by various participants. To some, it was part of a more responsible lifestyle choice:

- Participant 1: I think once you experience doing things [like] conserving energy, you have a consciousness. And

along with that consciousness is a responsibility of how you deal with your energy use. You feel it in everything, whether you recognize it or not, when you go someplace else, you use habits that you learned. It's a good feeling, it's a real good feeling.

Participant 2: It is.

To others, it was a means for affording greater comfort. According to one participant, who had moved a family from a one-story home to a two-story ZEH home,

...I've never meet anybody who was really happy with their two-story home. It's like, well, that's just for families. We thought that we should [get one] for the kids and so my whole approach [in considering a Zero Energy Home was] if we can at least break even on what our energy bills are compared to our old home, then I'll be very happy. And so we have actually beaten...I mean, it's actually less than our old home. And it's quite a bit bigger home.

Another ZEH homeowner appreciates not only the greater comfort, but also greater savings over time:

I paid more for my little one-room apartment, the energy bills, than my house. When we were done, we were paying \$400 and I probably pay the highest here, \$78.00...and...you look at a \$78.00 bill and you go, that's not bad for what we're doing. And that's saving money, so much money in the long run.

Yet another participant now views energy in a whole new light, as a money-making enterprise:

When [the sun] is down, though, it's like you get mad because you know you're losing money. I'll watch the sun in the afternoon and think about energy production!

On the other hand, when asked whether any of the energy-efficient features of their home disappointed them, responses varied:

Participant 1: No.

Participant 2: Yeah, the water heater does take time to heat the water...it's not very long. It's not a deal killer... It's about thirty seconds I think.

Participant 3: No, not yet.

Participant 4: At our house, we have two bedrooms over the garage...that's what we're really not happy with about our home...the temperature in those rooms is different than the rest of the house.

- Participant 5: We have that problem too...they're always hot no matter what you do.
- Participant 6: We put extra insulation because it was over the garage...and had insulation put above the garage...it was an upgrade.
- Participant 5: We didn't get to do it. We got in too early.

Non-ZEH Homeowner Viewpoints on the Influence of Homeownership Experience on Energy-Efficiency Considerations

While energy performance appears not to have been a deciding factor in the purchase decision of non-ZEH homeowners, in some cases it has taken on greater importance over the first year of their homeownership experience:

- Moderator: Were there any special features of your home, itself, that made you want to purchase it?
- Participant 1: Not much in particular. It was just a nice, new home. I liked the garage they have, two-car garage. You enter from the side. And a bedroom downstairs with a full bathroom.
- Participant 2: I liked that. I have a three-car garage. I've got two-car and a one-car. I wanted at least two, and I got three, and I'm happy that we have three. If they had four, I'd have taken that one.
- Moderator: Some of your home's features can be described in terms of their energy performance. Do you know which features are energy efficient?
- Participant 1: In the [non-ZEH] homes, they're not the Zero Energy ones?
- Moderator: No, they're not, but they do have some energy-efficient features.
- Participant 1: Yeah, I don't know what they are because it seems to leak like a sieve, and it's hard to keep hot, hard to keep cool. And then the damned blower's going every ninety minutes for ten minutes, and it seems to exchange all of the air you just spent money to heat. The insulation is not much.¹⁴

¹⁴ This home, like all others in the non-ZEH development, is certified by the local utility as an "Advantage Home" at the "Gold" level. It uses R-30 insulation in the ceiling and R-17 insulation in the wall assembly. In combination with other features of the home, the utility estimates that this home likely performs approximately 30 percent more efficiently in cooling than other homes built to the state's strict Title 24 standard. Note that this participant's disappointment with the performance of his home is clearly stated in the context of awareness of neighbors' Zero Energy Homes.

In all, participants recalled a range of experiences in past and current homes that were tied to their attitudes toward and preferences for various home features. For homeowners in our sample, home size mattered and more was generally preferred, just as we observe in national surveys. But to ZEH homeowners, energy efficiency appears to have mattered more at the time of their purchases, despite an apparent lack of effort by the builder to sell this feature. Non-ZEH homeowners' lower preference for energy efficiency appears to have been accompanied by, among other things, relatively lower awareness of the value of energy efficiency at time of purchase. Awareness among non-ZEH homeowners in our sample has grown over the past year of ownership, having been associated with the experience of paying energy bills (which presumably they paid in their previous homes) and also the close proximity of neighbors whose bills are substantially lower and who have solar panels conspicuously placed on their roofs.

3. Conclusions and Options for Further Research

We draw several tentative conclusions from our focus group discussions with homeowners, some that confirm findings from our previous interviews with homebuilder executives and some that inspire new paths of inquiry and opportunities for energy policy research.

It is important to remind the reader again of the small sample size, self-selection of our participants, and the post-decision focus group approach¹⁵ this study has employed, which calls into question issues of reliability, validity, and the extent to which we can generalize our findings. Note also that we report in terms of the role of energy efficiency, when in fact our natural experiment varies only two energy-efficient features (solar panels and tankless water heaters) among groups. Our justification is that discussants more often speak in terms of the “energy package” (which includes several features that contribute to the energy performance of their home) and energy bills (which do not differentiate among the technologies that determine them). For these reasons, we interpret our results as broadly applicable to the role of energy efficiency in purchase decisions. Furthermore, the intent of this working paper is to provide a relevant basis for follow-on research that more rigorously tests our findings and further explores various insights.

To this end, our findings suggest at least three promising lines of inquiry: (1) mixed-method approaches to understanding the valuation of energy efficiency in homebuyer decisionmaking, (2) exploring “comfort” and “quality” associations with energy efficiency for their marketing potential, and (3) investigating the impact of neighborhood design on homeowner’s attitudes toward energy efficiency of their homes and future home purchases.

¹⁵ Recall that the particular concern with interviewing homeowners after they have made their decision is regarding “cognitive dissonance” – i.e., their psychological inclination to voice support of their previous decision.

Homebuyer Decisionmaking

Home purchase decisions reflect a range of considerations including affordability, resale investment value, mortgage availability, timing, and lifestyles, together that are as varied as the individuals making the decisions and their particular situations. Nonetheless, if our “natural experiment” is valid, we have been able to reveal subtle variations in homeowners and their preferences for different levels of energy efficiency among a reduced set of other considerations.

Overall, we report that ZEH and non-ZEH homeowners sorted themselves mostly according to preferences for home size or energy efficiency. Both groups of homeowners described disappointment with the smaller size of the ZEH product, which is consistent with a preference for larger homes reported in national surveys. Non-ZEH homeowners in our sample, in a trade for 12–15 percent greater floor area, on average, reported paying energy bills that were about twice as high as those paid by ZEH homeowners. This comparative valuation may be more rigorously established using econometric analysis (described further below).

In addition, given that information about energy performance characteristics and cost savings were not often shared by the builders until after the purchase decision was made, one might question whether the decision was well informed. The value of this additional information to homebuyers may also be established using econometric methods.

Further Research on Homebuyer Decisionmaking

Previously, we reported that there are scant, largely anecdotal publicly available data on the value that consumers place on energy efficiency in new homes, and likewise for quality and comfort (Hanson et al., 2004). Existing consumer surveys, we suggested, simply do not represent energy efficiency in sufficient detail and recognition of its context in purchase decisions. We also constructed an analytical framework that will allow for more suitably targeted data gathering and much needed empirical analytic work that consistently compares consumer values within and across the categories of interests. We suggested that further efforts should bear in mind several important classes of questions:

- How do homebuyers interpret “energy efficiency” in new home construction? Likewise, how do they interpret “comfort” and “quality”?

- What associations do buyers make among quality, comfort, and energy-efficiency attributes and features?
- What relative preferences do buyers have for attributes from among these three classes?
- How do preferences for the home associate within the greater context (neighborhood, community, commute to work, and homeownership experience)?

The focus group approach we have taken in this study appears to be well suited to the task of elaborating the rich details of these associations and preferences, but applying particular insights more generally in policy development requires validation through more rigorous approaches. A host of survey methodologies and analytical methods exist for analyzing stated preference methods (conjoint analysis and discrete-choice modeling) and contingent valuation (widely used for valuation of nonmarket environmental goods). Applying these methods in pre-purchase surveys has the advantage of avoiding the problem of cognitive dissonance among respondents that has likely affected our post-decision focus group discussions.

Econometric methods are appropriate for analyzing actual purchases (revealed preferences), thus overcoming the reliability issues of stated preference approaches. The hedonic pricing method, furthermore, allows for the implicit valuation of components of an aggregated purchase, when only the aggregate expenditure is observable. Insights from our focus group discussions make possible a meaningful hedonic price analysis of the purchase decisions of residents in our study area, in particular to quantify the implicit value of energy efficiency, floor area of bedrooms and living rooms, and information provided by the builders (which varied in content across ZEH and non-ZEH groups, and also over time for the ZEH group).

We recommend further research efforts that employ interviews with builders, focus group discussions with homeowners, and survey and econometric methods, together to triangulate information on homebuyer decisionmaking. Open questions remain:

- How do homebuyers value energy efficiency among myriad other considerations when purchasing a home?
- Under what conditions (including providing information) does the value of energy efficiency increase in relation to others and reveal itself in the purchase decision?

Furthermore, if research into homebuyer decisionmaking has the underlying intentionality of encouraging demand for residential energy efficiency, one might also consider various “story-based” planning theories. Throgmorton (1992), for example, describes “persuasive stories” as means to convince “interpretive communities.” Many such communities are less impressed by numerical demonstrations of energy cost savings¹⁶ but instead by stories that “incorporate the literary techniques of plot, point of view, character, and use of tropes, and that weave conflict and crisis together in a compelling manner. Most importantly, the story must drive toward a convincing resolution of inherent conflicts” (Myers and Kitsuse, 1999). With this in mind, further research might ask:

- What are the elements of the stories that compel homeowners to purchase their homes?
- Can a more persuasive “story” motivate consumer demand for energy efficiency?
- What would be the “literary technique” required?

Decision support system researchers now recognize the value of combining “cold” and “story-based” analysis into systems of knowledge, and social science researchers increasingly turn to qualitative research approaches and mixed qualitative-quantitative approaches to better understand and model real-world phenomena within social contexts.¹⁷

In all, we recommend further research efforts that employ qualitative interviews with builders and also focus groups with owners of varying homeownership experience. Focus group discussions should include homeowners who vary in homeownership experience, who live in homes performing at varying levels of energy efficiency, and who live in various locations of the United States. A systematic approach that considers decisions in “story-based” terms, in combination with consumer surveys that assess more rigorously the various decision elements and test potential methods of delivering consumer information, and econometric analyses that validate them in the actual purchases can inform our understanding of complex consumer preferences and may provide what is necessary to promote greater energy efficiency in residential development.

¹⁶ Consider the non-ZEH homeowner who listed first and foremost granite countertops as the determinant in the purchase decision. Consider also the two ZEH homeowners who bought “on faith” and “blind.”

¹⁷ See Davis, Kulick, and Egner (2005) for a useful review of decision science.

Marketing Energy Efficiency

We reported previously that builders recognize the broad marketing appeal of offering energy-efficient homes (Hanson et al., 2004). Both ZEH and non-ZEH products in this study have been marketed, to some degree, for their energy efficiency.

We also reported that some builders are hesitant to promote energy-efficient features that exceed perceived consumer demand, for fear of compromising the sale. This hesitance appears to be supported by homeowners' statements in this study; i.e., often builders did not provide information on energy performance of their homes until after the purchase decision was made. However, in this study, we also report at least one ZEH homeowner that was persuaded in part by the builder's description of energy features of the home. The following lists several observations regarding issues that may be relevant to how builders present sales information:

- Energy-efficiency considerations were clouded by many other factors in the context of the decision. And, in some cases, it was not discussed at all with the builders before the sale.
- Choosing custom options appeared to be a frustrating experience for homebuyers. One participant particularly appreciated that energy efficiency was "integrated together" and offered as a standard feature of the home.
- As reported previously, energy efficient features are often attractive for "comfort" and "quality" reasons (e.g., low-emissivity windows were often favored for their ability to reduce sun damage to indoor furnishings). In this study, one homeowner expressed interest in gazebos that could support additional solar panels.
- Awareness of the value of energy efficiency appeared to grow with homeownership experience. This growing energy awareness appears to be associated with communications among neighbors regarding energy bills.

Further Research on Marketing Energy Efficiency

Energy cost savings' appeal to homeowners, yet convincing homeowners to pay up-front for savings in the future, remains a tough sell. In other words, home features that promise "comfort" or "quality" often have greater appeal to homebuyers than features that promise "energy efficiency." However, builders

and homeowners name several amenities that serve multiple purposes, including energy efficiency (e.g., multi-zone HVAC systems that better moderate indoor temperatures, trellises and gazebos that can support solar panels, and low-emissivity windows that protect furnishings from sun damage). The potential for cross-selling energy efficient “options” according to their promise of comfort and quality remains open. How to present information to consumers that discloses the various merits of homes and their features in convincing fashion can be explored further. One model to investigate is the Energy Star program, which labels energy efficient appliances with the familiar yellow tags that summarize energy performance characteristics and potential energy cost savings.

To this end, further research can address the following questions:

- What are the comfort and quality dimensions of various energy-efficient home features?
- What are proven strategies for marketing these energy-efficient features, according to their comfort and quality dimensions?
- What have we learned from the Energy Star labeling program experience for appliances that is relevant to new home construction and sales?

Furthermore, builders are required to initiate homeowner associations in new subdivisions. Yet the potential for builders and utilities to incorporate rewards for energy-efficient behaviors into more formal agreements (i.e., through covenants, codes, and restrictions) appears to be untapped. Local utilities might be involved, for example, in rewarding neighborhood communities that committed to certain energy-efficiency innovations. Potential homebuyers might find such neighborhoods attractive. Open questions remain:

- How might builders and utilities coordinate interests through the development of homeowner associations?
- How might homebuyers respond to such programs?

Developing a catalog of energy efficient features, along with strategies for marketing these items, potentially creates win-win opportunities for encouraging residential energy efficiency while also generating additional builder profit. Formalized agreements between utilities and neighborhood associations that promise rewards to homeowners for energy conservation efforts may attract homebuyers to consider these new home developments and generate homeowner energy savings.

Energy Awareness in Neighborhoods

Several ZEH homeowners expressed their intent to consider energy performance in their next home purchase. One ZEH homeowner, citing satisfaction with the current home, intended only to move to another Zero Energy Home. ZEH homeowners were pleased with their energy bills, describing them as the lowest they had ever paid. By contrast, several non-ZEH homeowners in our sample expressed concern for the energy bills they paid, along with disappointment with the energy performance of their non-ZEH home. Recalling that the non-ZEH homes in our study area were certified by SMUD as “Advantage Homes” at the “Gold” level, and estimated to perform approximately 30 percent more efficiently than conventional homes, this is somewhat surprising. We interpret the statements of the non-ZEH homeowners in our sample as evidence of growing energy awareness in these homeowners, and potentially a greater preference for energy efficiency in the next home purchase. This growing awareness appears to have been facilitated in part by informal communications among neighbors living in adjacent ZEH and non-ZEH homes. We report that at least one non-ZEH homeowner’s disappointment¹⁸ was stated in the context of awareness of neighboring ZEH homes. Elsewhere in the focus group discussions, communications among ZEH and non-ZEH homeowners regarding energy bills were also reported. We suggest that these observations have implications for neighborhood design.

In partnership with the Congress for the New Urbanism and the Natural Resources Defense Council, the U.S. Green Building Council has recently expanded its Leadership in Energy and Environmental Design (LEED) program to include a focus on neighborhood design (i.e., LEED Neighborhood Development program, or LEED-ND). The LEED-ND program is currently being piloted in several locations across the United States. The LEED-ND rating system incorporates principles of “green building,” “new urbanism,” and “smart growth.”¹⁹ What it does not incorporate is a credit for developing greater energy awareness in its residents, which as homeowners move from home to home, neighborhood to neighborhood, over a lifetime of home purchase decisions, may be at least as important as the energy-efficient homes and neighborhoods they leave behind.

¹⁸ Note that if the phenomenon of “cognitive dissonance” explains why people are less likely to express disappointment with their previous decisions, this homeowner likely understates the value placed on energy cost savings.

¹⁹ For more information on these concepts and organizations, see the websites for the Green Building Council (<http://www.usgbc.org/>), the Congress for the New Urbanism (<http://www.cnu.org/>), and Smart Growth America (<http://www.smartgrowthamerica.com/>).

Further Research on Energy Awareness in Neighborhoods

Our findings suggest that interactions among neighbors may have special relevance for encouraging energy-efficiency purchase decisions. If increased energy awareness correlates with greater demand for energy efficiency in homes, and if this awareness is influenced by neighborhood design, this line of inquiry may have important implications for the recently piloted LEED-ND rating system. Open research questions remain:

- Does energy awareness increase through informal, socially mediated neighborhood processes?
- Does heightened energy awareness translate into energy efficient home purchases?
- How might neighborhood design influence energy awareness?

Our results suggest that the mix of ZEH and non-ZEH homes may be related to increased awareness in the non-ZEH homeowners. If this is the case, neighborhood design that incorporates this may achieve greater energy awareness in the long term, accelerate demand for energy efficiency in future markets for new homes of all sizes, and have important implications for builders' strategy as well.

Appendix 1: Pre-Discussion Questionnaire

Household Information

1. Including yourself, how many adults are now living in your household?
(Include all adults over 18 years of age.)
2. How many children are now living in your household? (Include all infants and children who usually stay with you as a member of your household.)
3. How many people in the household are currently working for pay? (Include those who work either full- or part-time.)
4. Including your current home, how many homes have you owned and lived in as your primary residence? (Include houses, condominiums, and apartments. Do not include vacation homes, or rental experience.)
5. When did you purchase your current home? (Provide month and year. If unsure, provide your best estimate.)
6. In the year before you purchased your current home, what other communities did you consider? (Include county and state, if outside Sacramento, California.)
7. What was the purchase price of your home? (If unsure, provide your best estimate.)
8. How much money did you put as downpayment? (Provide as percentage of purchase price, or as monetary amount. If unsure, provide your best estimate.)
9. What is the interest rate of your mortgage? (If unsure, provide your best estimate.)
10. What was your total (gross) annual household income for the past year? (If unsure, provide your best estimate.)

Appliances and Pool

11. Tell us about the refrigerator(s) in your current home. If you have more than one, provide answers for each of them.
 - a. How old is it?
 - b. How large is it? (If you are unsure, is it "small," "standard size," "over sized"?)
 - c. Where is it located (Is it in the kitchen? Is it in the garage?)

12. Do you have any of the following appliances in your home? If so, how many? If unsure, provide best estimate.
 - a. automatic dishwasher
 - b. trash compactor
 - c. clothes washing machine
 - d. electric clothes dryer
 - e. portable generator
 - f. television
 - g. stereo and sound systems
 - h. VCR and DVD players
 - i. computers (desktop or laptop)
 - j. printers
 - k. microwave ovens
 - l. toaster and convection ovens
 - m. waterbed mattress heaters
 - n. ceiling fans
 - o. air purifiers
 - p. electric tools

12. Does your home have a swimming pool? If so,
 - a. Is it installed above-ground or below?
 - b. What is it heated by? (e.g., solar, natural gas, butane/propane, electricity). (If unsure, leave blank.)
 - c. Does it have any of the following?
 - i. insulating cover
 - ii. solar heater
 - iii. filter pump
 - iv. sweep pump
 - v. waterfall pump

Personal Information

14. What is your age?

- a. 18 to 24
- b. 25 to 34
- c. 35 to 44
- d. 45 to 54
- e. 55 to 64
- f. 65 to 74
- g. 75 or older

15. Are you male or female?

- a. Male
- b. Female

16. What is the highest grade or level of schooling you have completed?

- a. 8th grade or less
- b. Some high school
- c. High school graduate or GED
- d. Vocational or trade school
- e. Some college/university courses or 2-year junior/community college
- f. 4-year college graduate
- g. More than 4- year college degree

17. Are you Hispanic or Latino?

- a. Yes, Hispanic or Latino
- b. No, not Hispanic or Latino

18. What is your race?

- a. American Indian/Alaskan Native
- b. Asian
- c. Native Hawaiian/Pacific Islander
- d. Black or African American
- e. White
- f. Other race (specify: _____)

Appendix 2: Discussion Protocol

Neighborhood and Home Features

1. What aspects of this development influenced your decision to buy your current home?
2. Did you consider other neighborhoods? If so, why did you choose this one over the others?
3. What specific features influenced you the most when you decided to buy your current home?
4. Was energy performance of your home important to you in your decision? What was more important?

The Home Purchase Decision

5. What information did you have about energy performance of your home when you considered buying it? Who provided that information?
6. How did the builder's sales staff represent your home's energy performance to you? What energy-related features of this home were described? Which features impressed you the most? What form (conversation, display, chart, graph, picture) was most influential?
7. Was energy performance described in terms of savings on utility costs? Did this information influence your decision?
8. Were any of you aware of SMUD's or DOE's or ConSol's interest in this subdivision? Along with the builder's sales staff, did any of these affect your decision to buy a home in this neighborhood? And if so, did some influence your decision more than others?

The Homeownership Experience

9. At time of sale, were you constrained in the options you could select from? If so, which additional features would you have selected if you could?

10. Did available mortgage financing affect the options you could choose from?
Did your estimates of utility bills affect your budget for options?
11. Has your wish list of options changed from then to now? If so, what features would you rather have selected?
12. Since moving in to your current home, has energy efficiency become more or less important to you? What changed its importance to you, and will your experience influence your next home purchase?
13. Do you talk about energy performance of your home with your neighbors?

References

- Barbour, R.S., and J. Kitzinger (eds.). 2001. *Developing Focus Group Research: Politics, Theory and Practice*. Sage Publications. London.
- Davis, P., J. Kulick, and M. Egner. 2005. *Implications of Modern Decision Science for Military Decision Support Systems*. MG-360. RAND Corporation. Santa Monica, Calif.
- Hanson, M., M. Bernstein, and J. Kulick. 2004. *Making a Tough Sell: Options for Promoting Energy Efficiency in New California Homes*. WR-164-CEC. RAND Corporation. Santa Monica, Calif.
- Hassell, S., A. Wong, A. Houser, D. Knopman, and M. Bernstein. 2003. *Building Better Homes: Government Strategies for Promoting Innovation in Housing*. Science and Technology Policy Institute. MR-1658- HUD/PATH. RAND Corporation. Santa Monica, Calif.
- Kamberelis, G., and G. Dimitriadis. 2005. "Focus Groups: Strategic Articulations of Pedagogy, Politics and Inquiry." In Denzin, N. Z., and Y. S. Lincoln (eds.). *The Sage Handbook of Qualitative Research, 3rd edition*. Sage Publications. Thousand Oaks, Calif.
- Krueger, R. A. 1988. *Focus Groups: A Practical Guide for Applied Research*. Sage Publications. London.
- Moezzi, M., and R. Diamond. 2004. *Is Efficiency Enough? Towards a New Strategy for Carbon Savings in California*. Lawrence Berkeley National Laboratory. Berkeley, Calif.
- Myers, D., and A. Kitsuse. 1999. "Constructing the Future in Planning: A Survey of Theories and Tools." *Journal of Planning Education and Research*.
- National Association of Home Builders. 2000. *What First Time Home Buyers Want*. Home Builder Press. Washington, D.C.
- National Association of Home Builders. 2002. *What 21st Century Home Buyers Want: A Survey of Customer Preferences*. Home Builder Press. Washington, D.C.
- Ortiz, J. 2006. "High-Rise Fever: A Rush of Towering Proposals for Downtown—but the Clock's Ticking." *Sacramento Bee*. Business Section. January 12 (<http://www.sacbee.com/content/business/story/14064597p-14895488c.html>).
- Salant, K. 2001. "Pay Now to Save Later." *HomeGain.com*.

Stinnett, B. 2005. *Think Like Your Customer: A Winning Strategy to Maximize Sales by Understanding How and Why Your Customers Buy*. McGraw-Hill. New York.

Throgmorton, J. 1992. "Planning as Persuasive Storytelling About the Future." *Journal of Planning Education and Research*. 12:17-31.