THE INFLUENCE OF TECHNOLOGIES ON THE HOMEBUYER'S PURCHASING DECISIONS: A PATH FIELD EVALUATION AT PITTSBURGH'S SUMMERSET AT FRICK PARK

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November 2003

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PARTNERSHIP FOR ADVANCING TECHNOLOGY IN HOUSING

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Acknowledgements

This report was prepared for the US Department of Housing and Urban Development by Newport Partners LLC of Davidsonville, Maryland. Newport Partners LLC is a small business providing a full range of analytical and technical services to its clients in both the manufacturing and public sectors.

The principal author of this project is Mark Nowak. Assistance and review were provided by Liza Bowles, David Dacquisto, and Lorie Ebersberger. Special thanks is extended to Stacy Hunt of IBACOS for her assistance throughout the project.

We also extend appreciation to the team of developers and builders of Summerset at Frick Park including Sally Pfaff, Melissa Titus, Murray Rust, and Roger Glunt.

Disclaimer

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Introduction

A recent evaluation of PATH program objectives and activities conducted by the National Academy of Sciences (NAS) identified the need to better understand barriers to the development and diffusion of technology for housing. The NAS report applauded the development of a market survey instrument and encouraged PATH to learn more about consumer response to new technologies.

One of the best opportunities to capture consumer reactions to technologies already exists in the form of demonstrations and field evaluations conducted by PATH and others. Many of these projects are designed to provide information on how different technologies work in new homes. This project builds on the existing field evaluation work by expanding it to address the preferences of consumers in the home buying process at a site already under construction.

The site, Summerset at Frick Park in southwestern Pennsylvania, offers a base of homebuyers who have made a decision to pursue the purchase of a new home at Summerset to compare with other recent new home buyers in the region. Summerset is also a *Building America* project, and has received technical support from the U.S. Department of Energy in return for the opportunity to test innovative systems and strategies that have the potential to increase energy efficiency.

Study Purpose and Objectives

This field evaluation provided PATH the opportunity to respond to the NAS desire to better understand the consumer's role in diffusion of technology and to provide valuable insight for the industry into how to motivate home buyers to pursue new technologies. The site has several appealing characteristics including the use of a wide variety of technologies that are the subject of interest to the PATH program; use of reclaimed land within a city; a large number of homes already complete, some under construction, and many more in the planning stages; and incorporation of many of the features frequently cited as good examples of "smart growth." These characteristics positioned the site as an excellent candidate to address the following specific questions:

- Why are potential buyers interested in purchasing a home in a certain location?
- What value do buyers place on specific technologies? How often does the presence or lack of a specific technology influence their purchase of a home?
- What percentage of the home buying public is motivated by innovation? How does the homebuyer in the general population differ from the innovative buyer?
- What information does a builder need to know to market technologies to the innovative buyer and to the general population of new home buyers? Answers to this question will be useful for developing strategies for builders to use in marketing innovative technologies.

Summerset at Frick Park

Summerset at Frick Park consists of 713 homes under construction on land formerly used as a slag disposal site. It is believed to be the largest residential development in the City of Pittsburgh since

the 1940s. The site overlooks the Monongahela River in what was previously an industrial area with extensive ties to the steel industry. With the decline of the steel industry, the area has been transformed through redevelopment including a waterfront shopping and restaurant area across the river from Summerset. The development is located next to a large park that offers recreational opportunities within walking distance.

Summerset is promoted as a "New Urbanism" community with a mix of high-density homes of various sizes and types. The design of the homes has been dictated by traditional city architecture on the exterior and a strong performance standard for energy efficiency. Homes styles range from town homes and small single family homes to larger estate homes. However, even the larger homes are designed to fit into a city neighborhood. The designers placed an emphasis on front porches, small lots, garages that load through rear alleys, and other features believed to create a sense of community and encourage interaction among neighbors.

The Summerset homes generated an enthusiastic response from potential buyers. The developer established a lottery list from which pre-approved homebuyers were eventually selected. The lottery list offered access to a group of buyers who had been drawn to the site due to its uniqueness and the innovation shown by the development team.

Approach

As mentioned previously, the Summerset site and homes offer an excellent opportunity to identify and evaluate the technology-related issues that consumers consider important when making home buying decisions. Newport Partners LLC approached the project as a team with the developer, the builders, and IBACOS, who is performing technical research and providing technical support at Summerset under the Department of Energy's Building America program. The genuine interest by the entire team in understanding the consumer viewpoint provided the motivation that is often missing from field evaluations of this type. Each of the team members stepped up to provide resources toward achieving the objectives.

After initial discussions, the team agreed that a survey of home buyers would be the best approach for achieving the objectives. Furthermore, a series of focus groups would be held to provide input in shaping the survey. Newport Partners LLC conducted the focus groups, analyzed the survey results, and provided other technical assistance.

Focus Groups and Related Findings

Two focus groups were conducted on June 30, 2003 at a model home in Summerset. The purpose of the focus groups was to better understand how potential buyers at Summerset and other new home buyers in the surrounding county view innovative technology; and what impact, if any, it has on their buying decisions. The results from this activity were primarily used in refining the more methodical homebuyer survey discussed later in this report.

The first group was recruited from the local population of recent buyers of homes built in 2001, 2002 or 2003. The second group was from the Summerset Lottery list and included several who were selected in the lottery to purchase a home at Summerset.

Comments from the focus group participants are presented below. Keep in mind that these comments represent qualitative input and do not necessarily represent the answers of all homeowners. The focus groups do, however, give the opportunity to probe participants and find out more of the rationale behind their answers than would be available from a survey. The full report on the focus groups, submitted separately to HUD, provides additional details to the summary points presented here.

- Generally, people like neighborhoods where they could take walks free from traffic hazards and trash. They desired lots that were easy to take care of, not with too much space, but with enough privacy to enjoy the outdoors with some seclusion from the neighbors. There was no prejudice against townhouses or tightly clustered units, if they could still get the privacy and adequate parking. There was a strong preference for garages.

- Both groups stated that their preferences would change depending on the stage of life they are in. Many in the general population group said they wanted the most square feet for the money, but plan to downsize later in life.

- Participants had mixed views on the environment. Several held the perception that housing destroys trees and thus has a negative impact on the environment. On the other hand, they also believe new homes are better for the environment because they are better built and are energy efficient. They clearly believe Summerset is a positive example of housing that can be developed with a good environmental impact because it took unattractive space and made it highly desirable.

- For the most part, homebuyers as represented by these groups want nice amenities, improved comfort, and upgraded features in their houses. There is little awareness of new technology and it generally has not entered into their purchase decisions. One exception is appliances that display Energy Guide labels. Many chose a mid-range performance because they don't really understand all the variables but believe if they buy at the top end they pay for more than they need, and buying at the low end would probably not be satisfactory.

- Each of the groups viewed several innovative products. With most products, they need more information to make a choice. Concepts like mechanical ventilation were largely lost on the participants. Consumer education on products and their benefits from a source home buyers feel they can trust seems appropriate.

Homebuyer Survey and Related Findings

The focus group responses were used to help develop a more-methodical survey to evaluate homebuyer's preferences relative to home and community features including innovative technologies. Participants for the survey included two groups.

The first group was selected from the local population in Allegheny County, where Summerset is located. Approximately 2700 permits were issued in 2000 in the county according to the U.S. Census. This compares to about 583,600 housing units that already existed in the county in 2000. The 2000 year U.S. Census data was further characterized to identify the localities with the highest number of permits issued for new homes. The county tax assessment database was then used to retrieve the names and mailing address of homes built in 1998 or later. Further massaging of the database reduced the list to only those properties for which the original home buyer was living in the home at the time of the mailing. Specific addresses were selected by starting with the communities with the highest number of permits and moving down the list in decreasing order. This captured all of the recent new home buyers in the localities for which significant new construction had taken place in the past four years. This process resulted in a list of nearly 1500 recent buyers of new homes.

The second group was self-selected in that they were participants in a lottery held by the development team to select buyers for the Summerset homes. This group was considered important because they represent potential homebuyers who were drawn to the innovative nature of Summerset, which had been heavily promoted for its innovative approach, and they were committed to purchasing a home at Summerset if they were selected in the lottery. This group consisted of about 700 households.

The survey instrument is contained in the appendix to this report. It has five main parts designed to address the project objectives.

Part 1 – Home or community benefits: This part of the survey is first designed to identify whether the community features or the home features are the motivation behind decisions, or if it is a combination of both. Second, it was designed to reveal what percentage of the population is driven by certain features in the home or community (i.e., size of the innovative home buyer market). Last, it was designed to see if there are differences between the innovative buyer (lottery participant) and the population of potential new home buyers in the region, and thus identify different marketing approaches for each group.

Part 2 – Green building: During the focus groups, it was clear that the participants were not sure what green building was all about. This part was designed to see what percentage of the population know about green building and its implications on their decisions. Further, the development team promotes "green" as an important part of Summerset and felt it was important to the overall marketing approach to better understand the consumer on these issues.

Part 3 – Brand identification: Some of the focus group participants strongly expressed their opinion that the performance of certain products or technologies was closely connected to brand name. The development team also felt it was necessary to the promotion of technologies to capture

consumer preferences for brand names. The survey questions focus on product types, not specific manufacturers.

Part 4 – Specific technologies: This part of the survey was designed to obtain value judgments on specific technologies or features. As with Part 1, it was also designed to determine what percentage of the population is driven by certain features in the home and whether there are differences between the innovative buyer and the local population of home buyers.

Part 5 – General information: This part captures the characteristics of the home buyer including age, income, whether they have children, and confirms that they are the original owner and live in the home (versus renting it to others).

Assessment of Survey Data Sets

Over 150 responses were received from the local population of recent new home buyers in Allegheny County and another 90 from the lottery list. Throughout this report, we refer to these groups as the county and lottery groups, respectively.

All of the lottery responses were deemed acceptable for the analysis. The responses from the county group were evaluated to identify those with problems related to accuracy of the information in the county tax database. The number of responses suitable for analysis was reduced to 127 for this group. The major reasons for disqualifying county responses were that the home was not owner-occupied or the occupant was not the original owner. For the lottery group, we did not eliminate renters nor limit the group to recent buyers of new homes. Rather, this group was important because they were (or still are) in market for a newly-built home and had demonstrated interest in the homes available at Summerset.

An initial hypothesis prior to analyzing the survey was that the lottery group would be more open to newer technologies than the county group of new home buyers. If this were the case, significant differences in the responses between the two groups should exist. Given the number of respondents in each group, a statistically significant difference in this case would be one where the responses differed by about 15 percentage points or more. Further, one should find a consistent difference between many answers before concluding that the groups are different in the way they make decisions, not just a few scattered items that differ.

When analyzing the data as individual groups, less than 5% of the answers showed a possible difference that may be significant. Almost all of these would be considered borderline differences from a statistical standpoint (i.e. less than about 15 percentage points for samples of this size). Thus, for the most part, the analysis presented in the following sections is based on combining the two sets of data into a single set of 217 responses. This is referred to as “pooled” data throughout the analysis. Where appropriate, data is presented for the separate groups where a possible difference exists and it has an implication on the objectives of the study.

Part 1 – Home or Community Benefits

The respondents were asked to select one of the following ratings for each of nine home-related benefits and five community-related benefits:

a. This item is very important to me and I would insist on it in my new home or community.
b. This item is important to me and I would strongly desire it in my new home or community.
c. I would like to have this item, but it is not a high priority for me.
d. This item is not important to me.
e. I prefer that this not be part of my home or community.

The items were presented as either home or community items. Home items were:

1. Extensive amounts of storage space
2. High levels of energy efficiency
3. High-speed internet throughout the home
4. Low maintenance, durable exterior
5. Hardwood flooring
6. Largest size home for my money
7. Plaster walls versus drywall
8. Recycled or environmentally-friendly building materials, and
9. Lots of windows

Community items were:

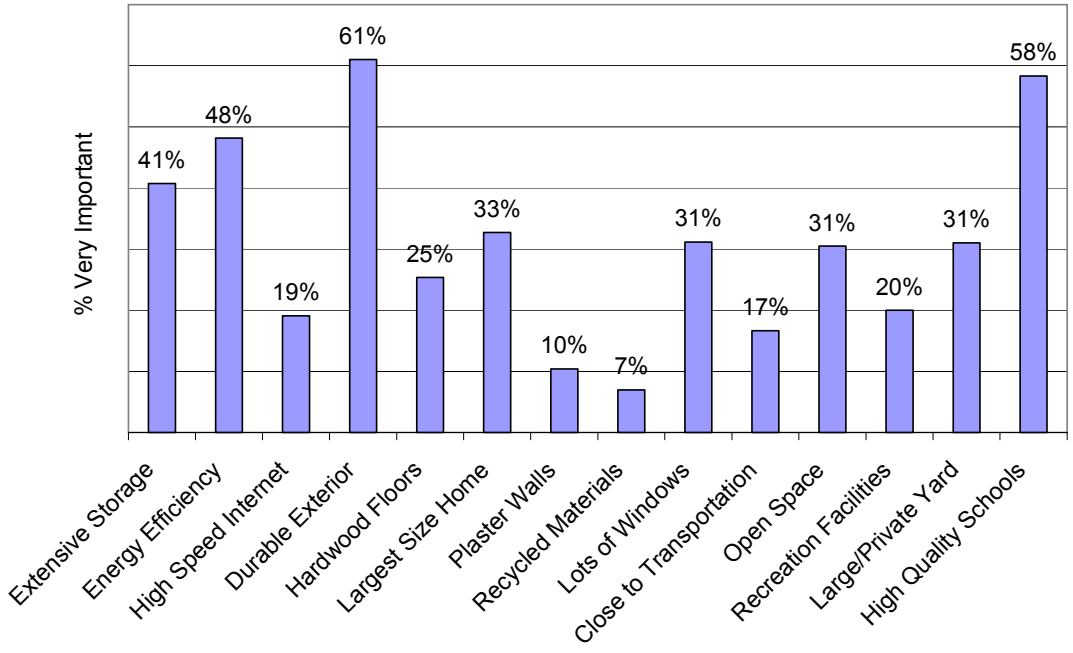
1. Convenient to public transportation or services
2. Preservation of open space
3. Nearby recreational facilities
4. Large or otherwise private yard, and
5. High quality schools

The survey results do nothing to dispute that location of the community and its surrounds are important to the home buyer. However, the results suggest that some home-relate items are just as important as or more important than some of the community items.

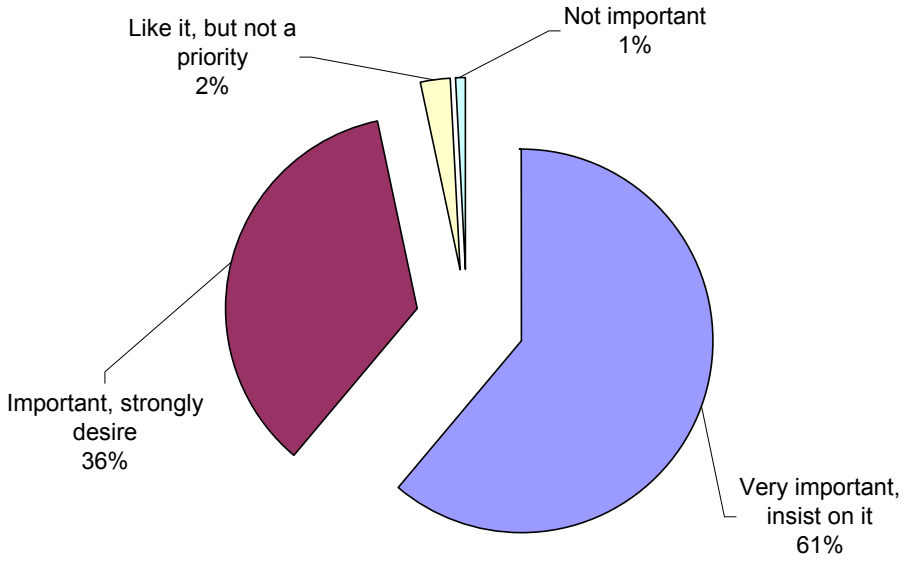
When the data was analyzed by looking at responses for a,b,c,d, and e individually, the three home-related features with the highest percentage of response “a” are (1) Low maintenance, durable exterior, (2) High levels of energy efficiency, and (3) Extensive amount of storage space. Note that answer “a” is indicative of the most positive reaction to the item. The following charts show how the 14 items compare to each other and how the answers for the top three items break down.

Abbreviated forms for the potential answers and items are used to facilitate graphical presentation of the results throughout this report. In addition, for some pie charts, the percentages may not add to 100% due to rounding.

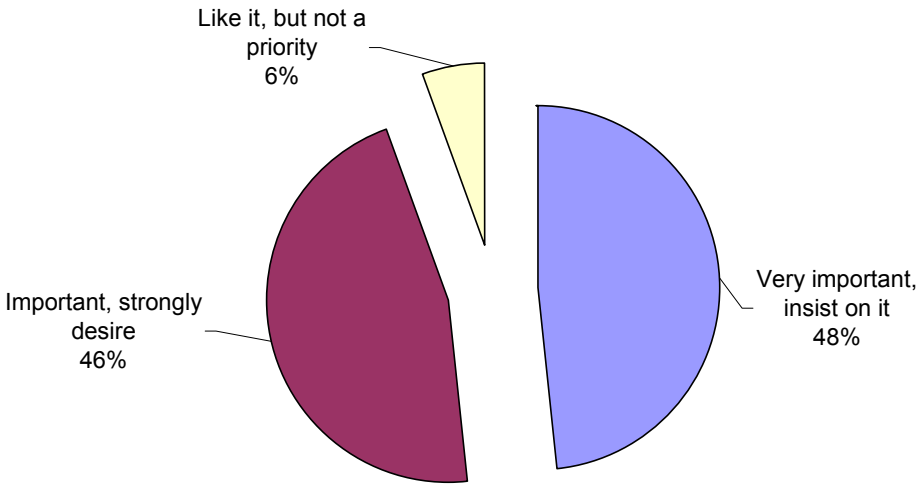
Home and Community Features
Pooled Data



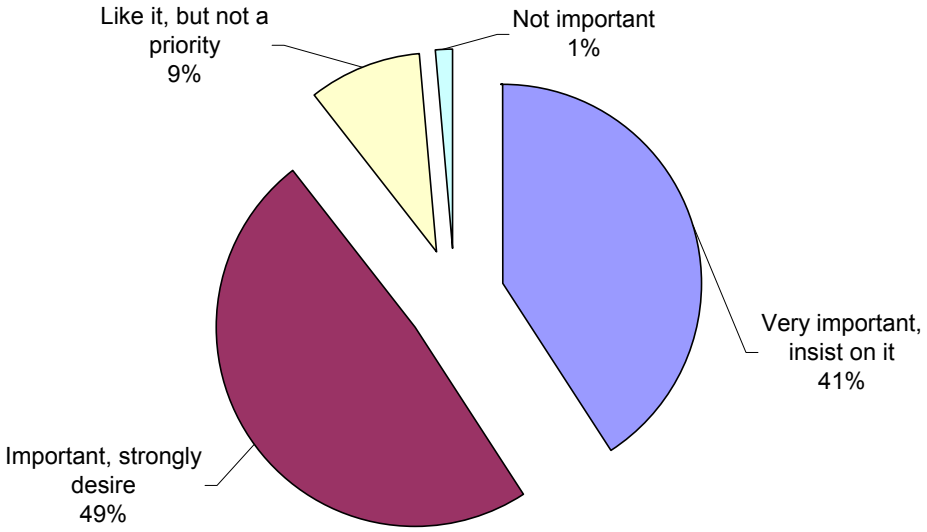
Low Maintenance, Durable Exterior
Pooled Data



High Levels of Energy Efficiency
Pooled Data

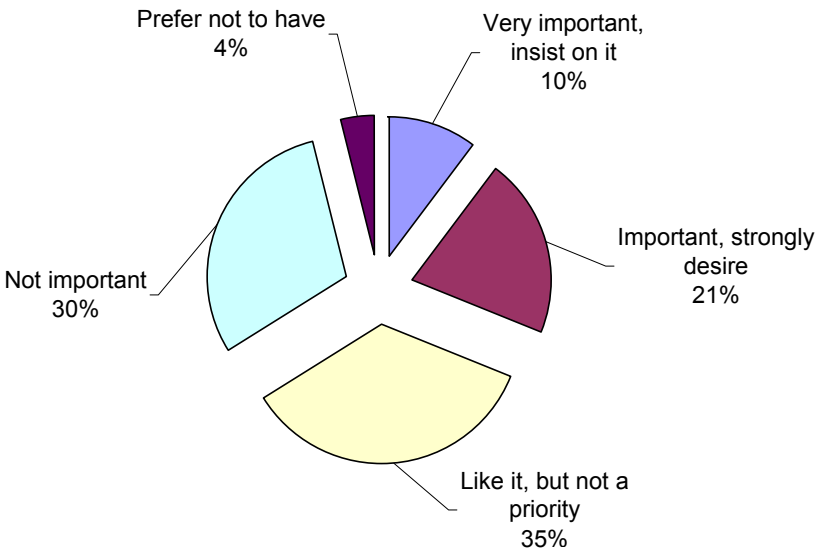


Extensive Storage Space
Pooled Data

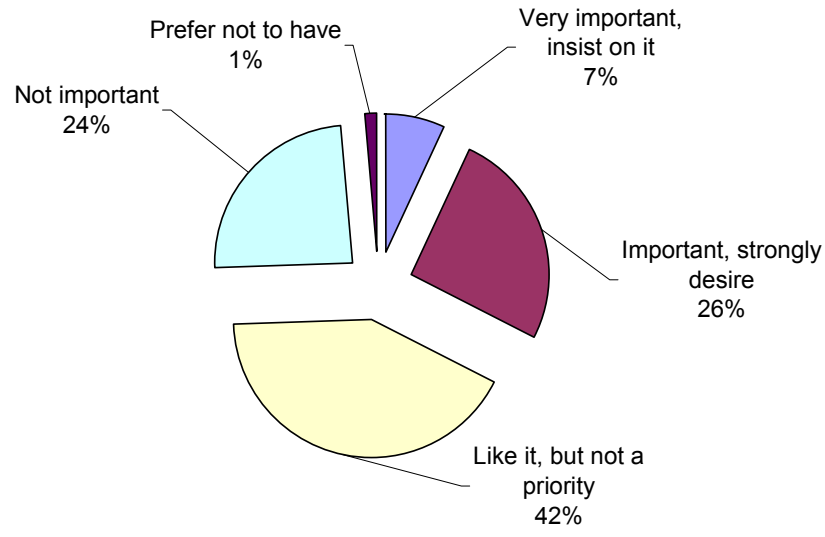


At the other end of the scale, the home-related items with the lowest percentage of "very important" responses to (answer "a") were "Plaster walls" at 10% and "Recycled or environmentally-friendly building materials" at 7%. An interesting observation is that "high-speed internet throughout the home" was also rated near the bottom in terms of percent of positive responses. Less than 20% of the responses for each group marked "a" for this item. During the focus groups, not one person raised issues related to the internet, although one participant later sent an email commenting that internet connections were important to her. It may be that wireless network technology and cable or DSL connections to the home have enabled high speed internet access with such relative ease that consumers no longer have to be concerned with wiring in the home.

Plaster Walls
Pooled Data

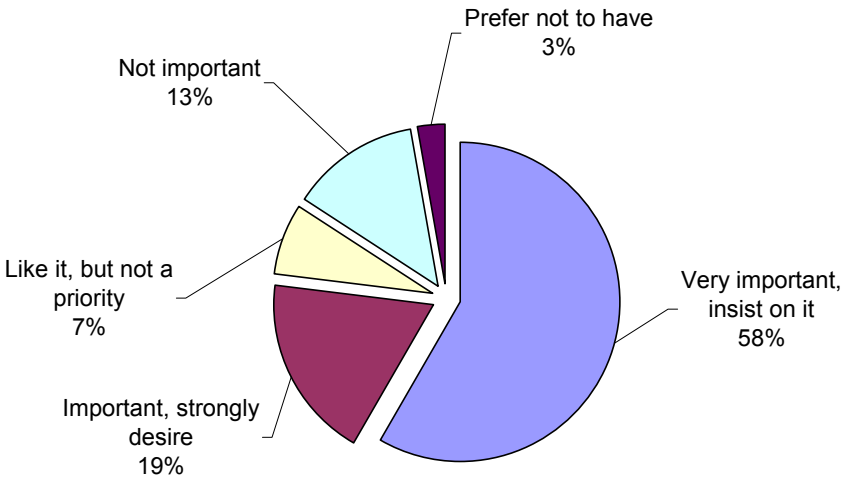


Recycled Materials
Pooled Data

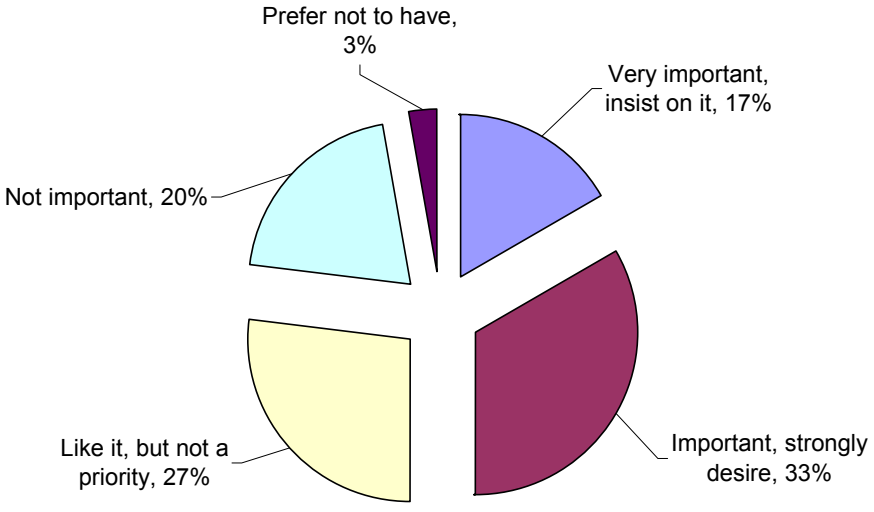


From the list of community-related benefits, the item with the most positive responses as indicated by answering “a” for the question was “high quality schools” at 58%. The lowest rated community item, at 17%, was “convenient to public transportation or services.” A breakout of the responses for these two items is shown in the following charts.

High Quality Schools
Pooled Data

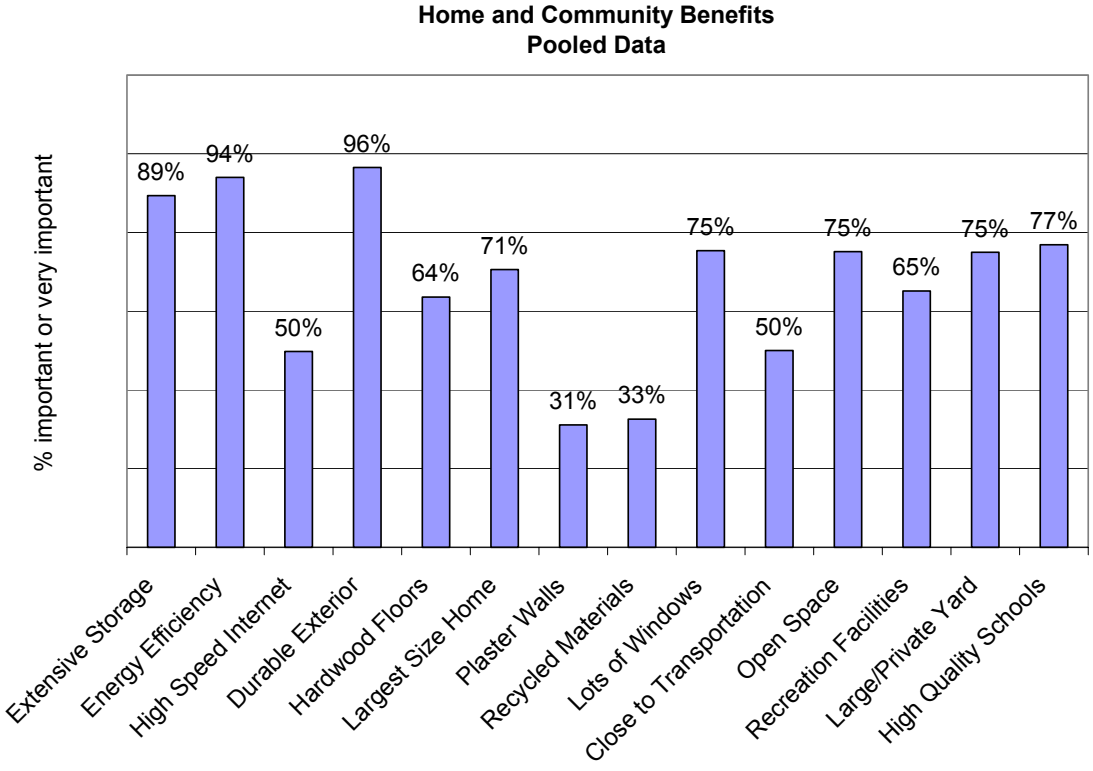


Convenient to Public Transportaion or Services
Pooled Data



Another way to look at the data is to group the positive, neutral, and negative responses together. Using this approach, an answer of “a” or “b” both indicate a positive reaction, “c” a neutral reaction, and “d” and “e” negative reactions. When the data is divided into these categories, the overall

conclusions are nearly the same as when looking at the possible answers individually. That is, energy efficiency, storage space, and low maintenance-durable exterior are the top items in terms of combined positive responses. Likewise, plaster walls and recycled materials have the lowest number of combined positive responses. The graph below shows the items in terms of combined positive responses.



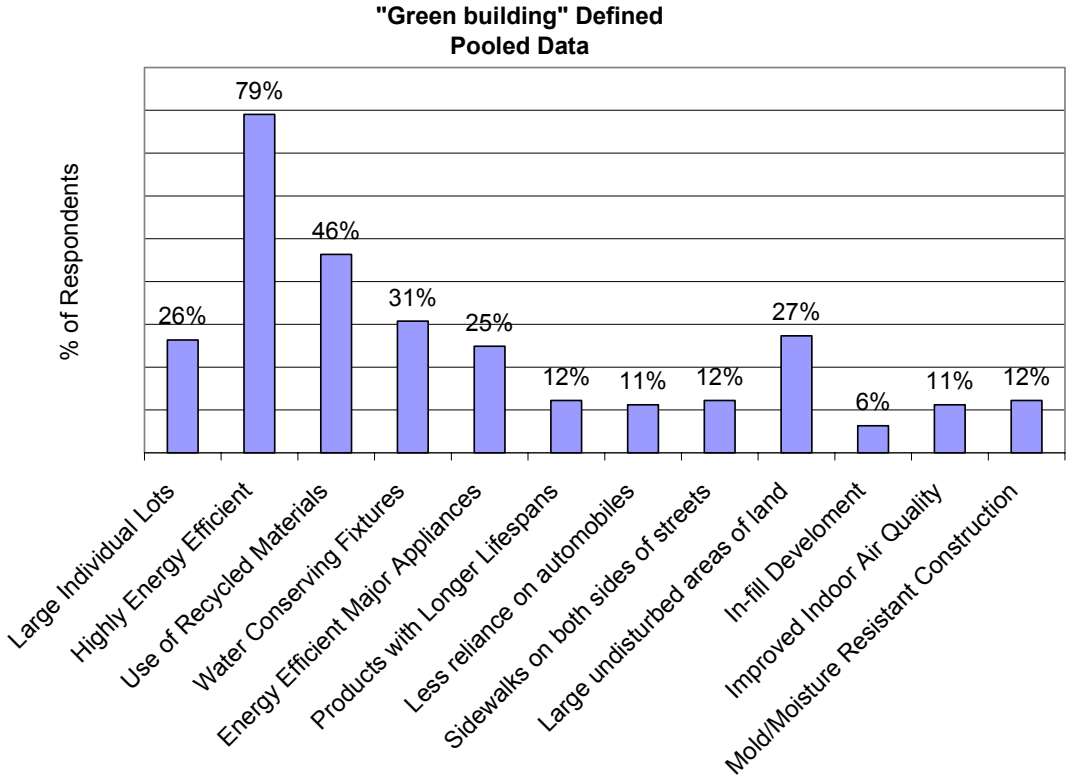
One notable difference between the county and lottery groups when analyzed separately was that high quality schools were important or very important to about 86% of the county group versus about 64% for the lottery group. This difference appears to reflect the higher percentage of households with children in the county group (nearly 80%) versus the lottery group (nearly 40%). When the data was analyzed without responses from those who had children living at home, the difference between the groups on this issue disappears.

Part 2 – Green Building

This part consisted of four questions. The first was whether the respondent had ever heard of green building prior to receiving the survey. About 34% of the participants responded yes to this question in the pooled data set versus 31% for the county group and 39% for the lottery group.

The second question asked the respondents to list the three items they believe best represent "green building" in a home or community. "Highly energy efficient home" rises to the top by a large margin. The second most often selected item is "Use of recycled materials" although this is less than 50% of the respondents. No other green building item captured more than about 1/3 of the responses. Keep in mind that these are the items the respondents believe represent green building,

and not necessarily items they prefer in their homes. In fact, responses to an earlier question in the survey indicated relatively few respondents had a strong preference for recycled materials.



Surprisingly, some of the items that were least often cited as representing green building are those that are often cited as important for sustainability or are otherwise cited as critical issues from the industry side. These include infill development, improved indoor air quality (IAQ), and mold/moisture resistant construction.

The data presented for this question includes responses from those who knew about green building and those who did not, even though the question presumes some knowledge of "green building." When the data was analyzed by looking at those who indicated they knew about green building separately from those who did not know about it, the overall conclusions do not change. That is, "Highly energy efficient home" and "Use of recycled materials" received the highest percentage of responses.

There are three areas where the group who knew about green building may differ from those who did not know about it. "Large individual lots with widely-spaced homes" was identified as green building about 22 percentage points more often by the group who did not know about the topic than those who knew about it. By the same margin, the group who knew about green building before the survey selected "energy efficient major appliances" more often than the other group. These results from the two groups would be expected. On the other hand, the group who knew of green building also selected "large undisturbed areas of land" less often (by about 15 percentage points) then the group who did not know about green building. Intuitively, one would expect the opposite result on this item. This suggests that more education is necessary to not only increase the number of people

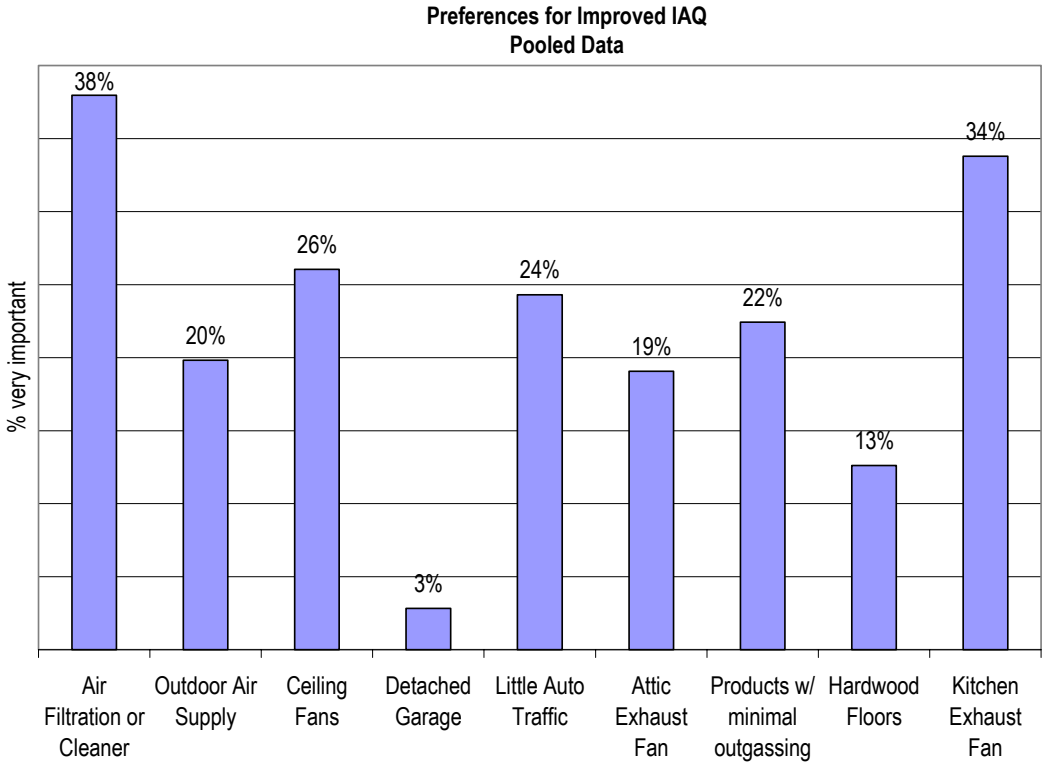
who know about green building, but also to educate them about specific practices that relate to this subject.

As mentioned previously, the data in the charts is based on the pooled data consisting of 217 responses from the county and lottery groups combined. There are two cases worth noting where a difference may exist between the two individual groups for this question: "Large individual lots" with 35% of the county group versus 18% for the lottery group and "less reliance on automobiles" with 5% for the county group versus 20% for the lottery group. Again, these differences are borderline statistically and could represent random variation given the number of responses and number of questions in the survey.

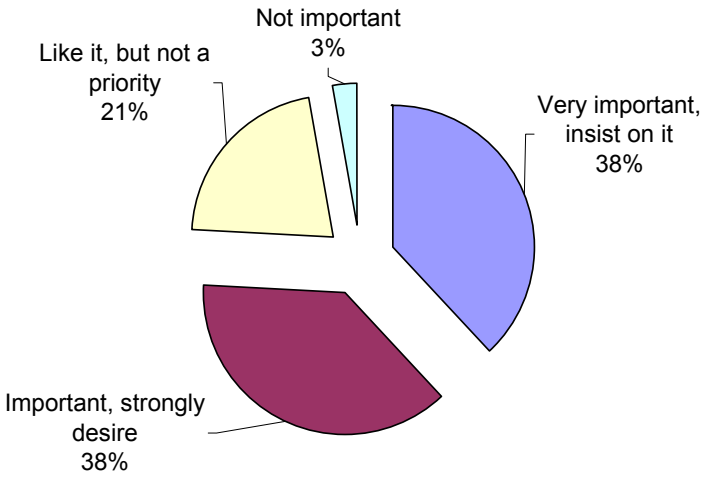
The third green building question asked respondents to rate different items in terms of their preference for them in their home to improve indoor air quality. The respondents had the option of the following ratings for each of nine items:

a This item is very important to me and I would insist on it in my new home or community.
b This item is important to me and I would strongly desire it in my new home or community.
c I would like to have this item, but it is not a high priority for me.
d This item is not important to me.
e I prefer that this not be part of my home or community.

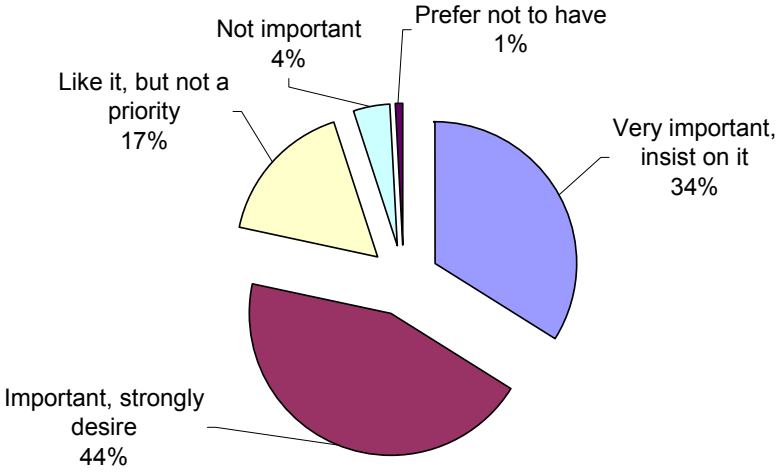
Analysis of the data looking strictly at those who answered "a," the most positive response, shows that the respondents prefer "Air filtration or cleaner" and "Kitchen exhaust" more often than any of the other features. The chart below shows how all nine items were scored relative to answer "a" followed by a breakout for the top two items ("Air filtration or cleaner" and "Kitchen exhaust").



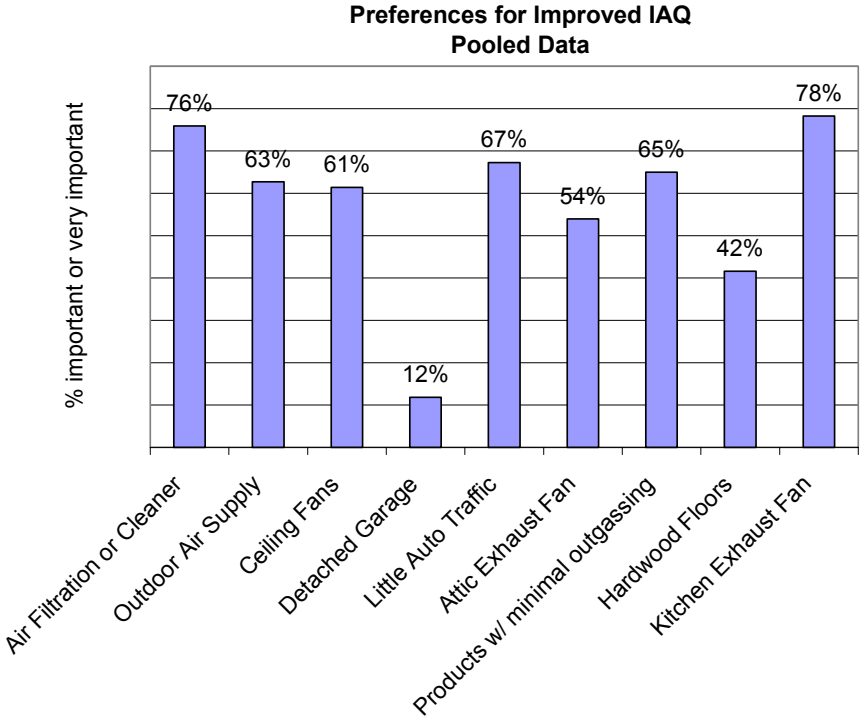
Air Filtration or Cleaner
Pooled Data



Kitchen Exhaust Fan
Pooled Data



This question can also be analyzed by combining the positive, neutral, and negative responses. In this case, "a" and "b" are positive, "c" is neutral, and "d" and "e" are negative preferences. This is arguably a better way to interpret the data since it divides the respondents into those who prefer the item versus those who do not prefer it, without regard to how strongly they prefer or do not prefer it. The chart below contains the results of this analysis, showing the percentage of responses for items that were either important or very important to the respondent (answers "a" and "b" added together).



"Air filtration or cleaner" and "Kitchen exhaust fan" are still preferred by more of the respondents than the other IAQ items when the positive responses are combined. "Little auto traffic" and "Products with minimal out-gassing" also were identified by about 2/3 of the respondents. Over 50% of respondents rated each of the other items as either important or very important, with the exception of "Detached garage" at 12% and "Hardwood floors" at 42%.

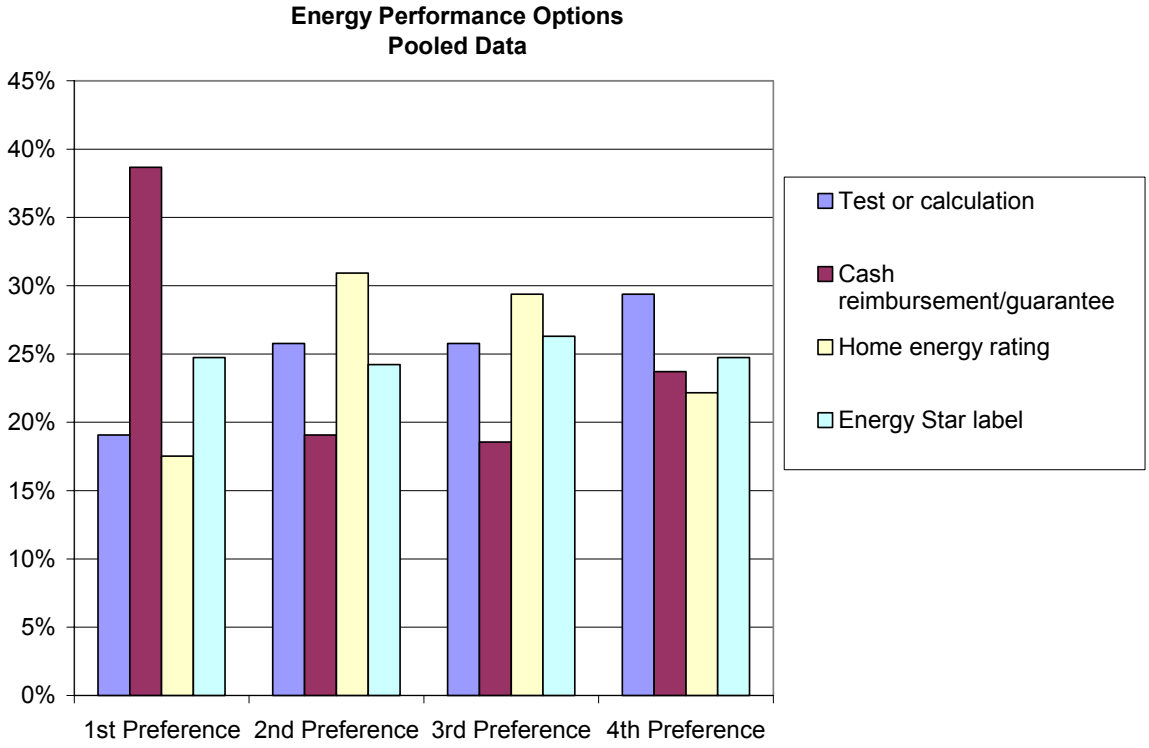
Note that identification of an item as a high preference in this question does not necessarily mean it will be a selling point to a large part of the general population. The survey did not address the absolute preference of consumers for improved indoor air quality. Rather, the issue was limited to its role in "green building."

The fourth question in Part 2 shows the respondent's preferences among four different options designed to provide some assurance that the home will perform at a certain level relative to energy use. The possible answers are as follows:

- Test results or calculations from the architect or designer estimating expected energy use of your home.
- A cash reimbursement guarantee that will pay a portion of your energy bill that exceeds a certain annual amount for the first year or two.

- A home energy rating prepared by an independent consultant that shows how your home compares to others on a scale of 1 to 100.
- An EPA-Energy Star label that shows your home exceeds energy code requirements by at least 30%.

The chart below shows the percent of respondents who ranked the answers first, second, third, or fourth. Considerable variation in the data is apparent. Perhaps the most meaningful result from this data is that a cash reimbursement/guarantee is the first preference of the four options, with close to 40% of the respondents rating this first.



One possible difference between the county and lottery groups involves preference for a cash reimbursement guarantee. With the county group, the cash reimbursement guarantee stands out as the first choice of respondents with about 44%. This option also was the most preferred option for the lottery group at about 32%, but only by a slight margin over an Energy Star label at about 30%.

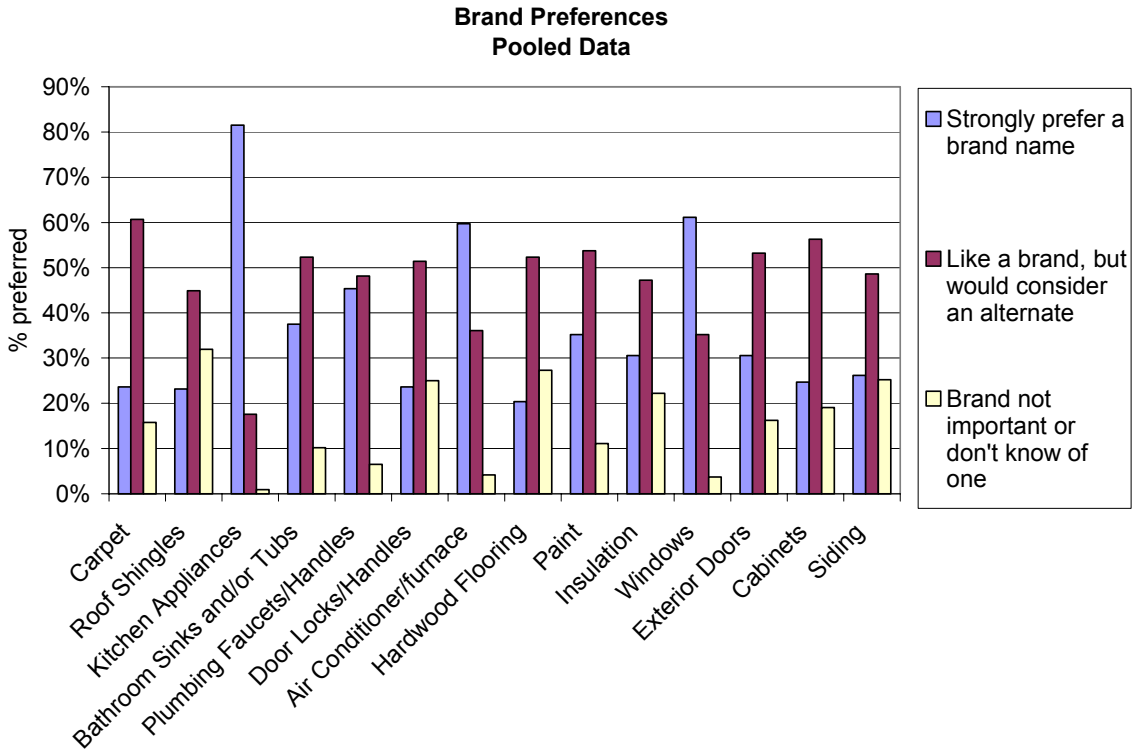
Part 3 – Brand Identification

This part contains one question asking the respondents to rate 14 types of products in the home according to whether they would prefer a name brand. They were given three possible answers for each product as follows:

1. I would strongly prefer a brand name that I recognize for this product.
2. I would like to have a brand name that I recognize for this product, but would consider an equivalent.

3. A brand name for this product is not important to me, or I don't know of any for this product.

Responses for each of the 14 items are shown in the following chart. One should keep in mind that the survey asked about categories of products and not specific manufacturer's brands.



Kitchen appliances, air conditioner/furnace, and windows received the highest response rate for **"**I would strongly prefer a brand name that I recognize for this product," with each receiving this rating from about 60% or greater of the respondents. As with other parts of this survey, one should not conclude that brand preferences for other products are not important, but rather that some are more important than others. For example, plumbing-related products (bathroom sinks/tubs and faucets/handles) received this same rating from over 1/3 of the respondents, which still represents a significant share of the market.

On the other end of the rating scale, few of the products received a high percentage of responses for "A brand name for this product is not important to me, or I don't know of any for this product." Roof shingles, at just over 30%, represented the highest number of respondents who indicated a brand name was either not important or they were not aware of one.

Another way to analyze this data is to combine the responses for those who would "strongly prefer" a brand name product with those who "would like" to have a brand name product. In this case, the overall preference for brands increases to more than 2/3 of the respondents for every product type. Thus, when looking at the results from Part 3, one should not conclude that home buyers do not value brand names for any of the products that did not rate high when looking at the "strongly prefer"

category by itself. Rather, the results point to several products (kitchen appliances, air conditioner/furnace, and windows) for which brand names appear to be more important than others.

Part 4 – Specific Technologies

In this part, respondents were asked to rate 10 technologies specifically used at Summerset. They were given four possible answers as follows:

a. I am convinced of the benefits of this item and strongly prefer it in my home.
b. I have no strong desire to have this in my home, nor would I object to it.
c. I am not familiar with this item.
d. I would not want this item in my home.

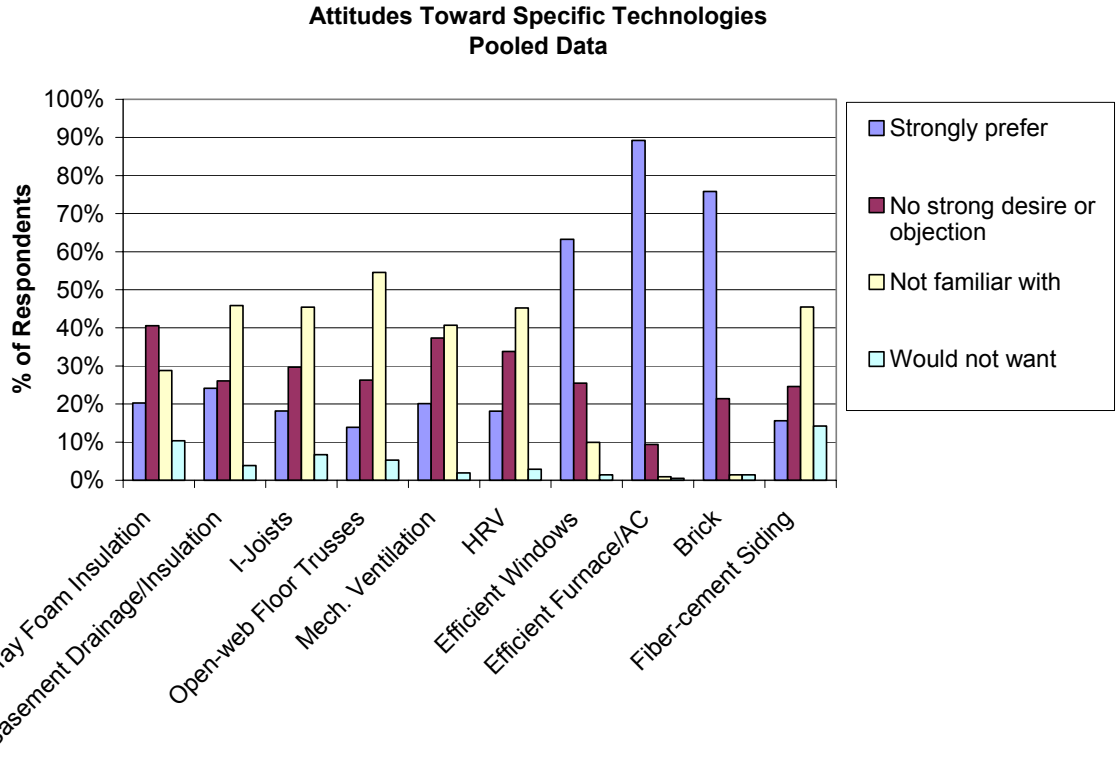
The nine technologies are:

1. Spray-applied foam insulation
2. Exterior basement drainage and insulation system
3. Wood I-joists for floor framing
4. Open-web trusses for floor framing
5. Mechanical ventilation system
6. Heat recovery ventilator (HRV)
7. High efficiency (Low-E and gas-filled) windows
8. High efficiency furnace and air conditioner
9. Brick exterior
10. Fiber-cement siding on the exterior

This question is perhaps one of the most revealing in terms of the objectives of the PATH program. It was designed to get specific feedback on technologies of interest to PATH and to look for differences between two groups in terms of their acceptance of innovative technologies.

From the initial analysis, differences between the county and lottery groups with respect to their preferences do not appear to be statistically significant, given the size of the data sets. One exception is with spray-applied insulation, where the lottery group had about 23 percentage points more of the responses than the county group for the answer “I am not familiar with this item” and about 21 percentage points less for “I have no strong desire to have this in my home, nor would I object to it.” As with several other items discussed previously, this observed difference for a single item may be a chance event and more confidence should be placed in the pooled data.

With the pooled data, the chart below shows that the respondents tend to have strong preferences for certain energy-related technologies and for brick. The responses for brick are consistent with the previous questions where a durable, low maintenance exterior was preferred.



Perhaps the most interesting of the answers in Part 4 is the high percentage of respondents under the category "I am not familiar with this item" for structural members like I-joists and open-web floor trusses, even though these products are widely used in new home construction. This is consistent with the view held by many in the industry that consumers pay little attention to "behind the wall" parts of the home.

For technologies that consumers do not want in their homes, only fiber-cement siding exceeded 10%. When the two groups were analyzed separately, there was no evidence that the lottery group was any more informed than the county group about innovative technologies.

Part 5 – General Characteristics

Responses to the questions in this part are shown in the table and charts below:

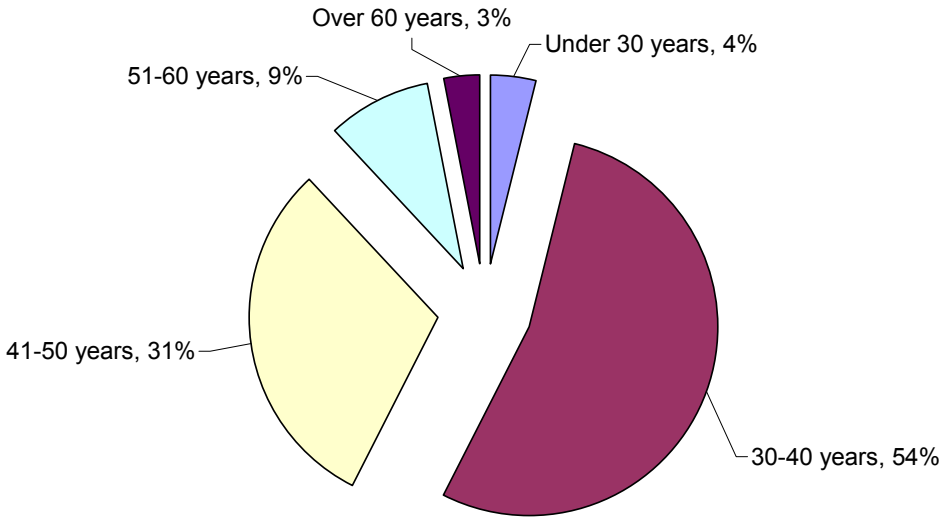
Item	County Group	Lottery Group	Pooled Data
Children at home	79%	39%	62%
Owner-occupied*	100%	85%	94%
Original owner*	100%	31%	72%

* Only those responding yes to this question were analyzed for the general population group

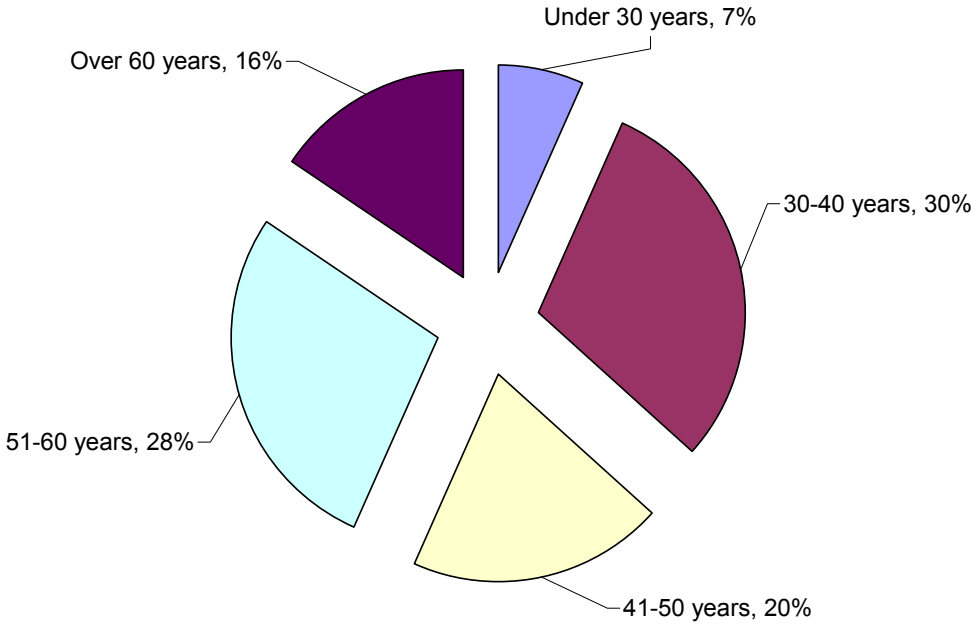
As mentioned earlier, the lottery group had about half the number of households with children living at home. The lottery group was also already classified as people who were either actively looking for a new home or who had already bought one. Their choice of home type (detached, town house,

etc.) was not considered important for the purposes of this study. On the other hand, the county group was intentionally limited to recent buyers of single-family-detached homes. Rather than attempt to determine which renters in the county group are actively looking to purchase a new home or plan to do so soon, responses from renters and those who were not original owners were simply removed from the county group data prior to the analysis. Note that some of the pie chart results do not add exactly to 100% due to rounding.

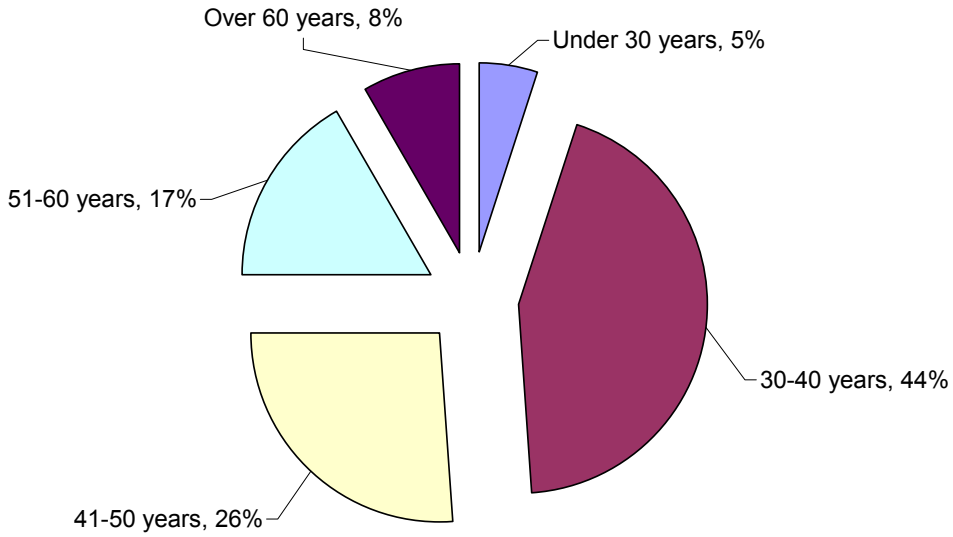
Age Distribution
County Group



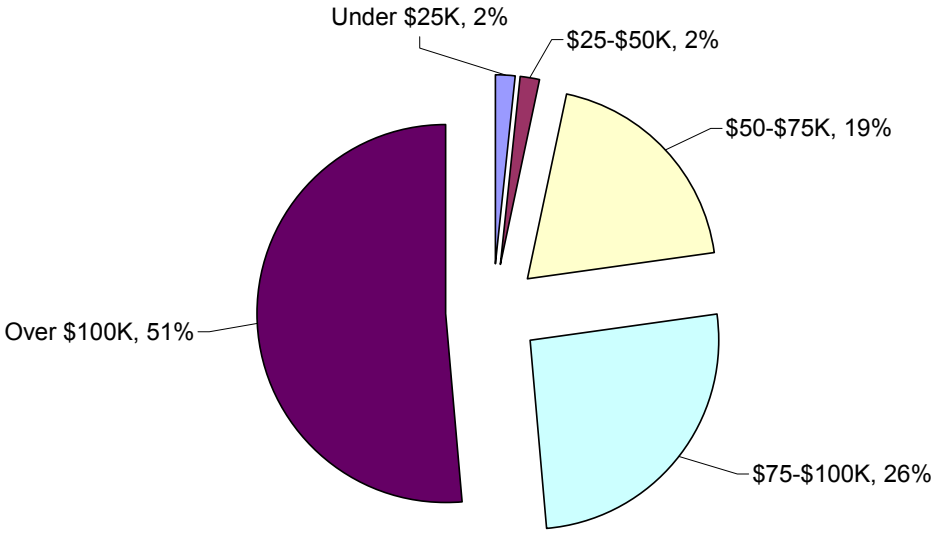
Age Distribution
Lottery Group



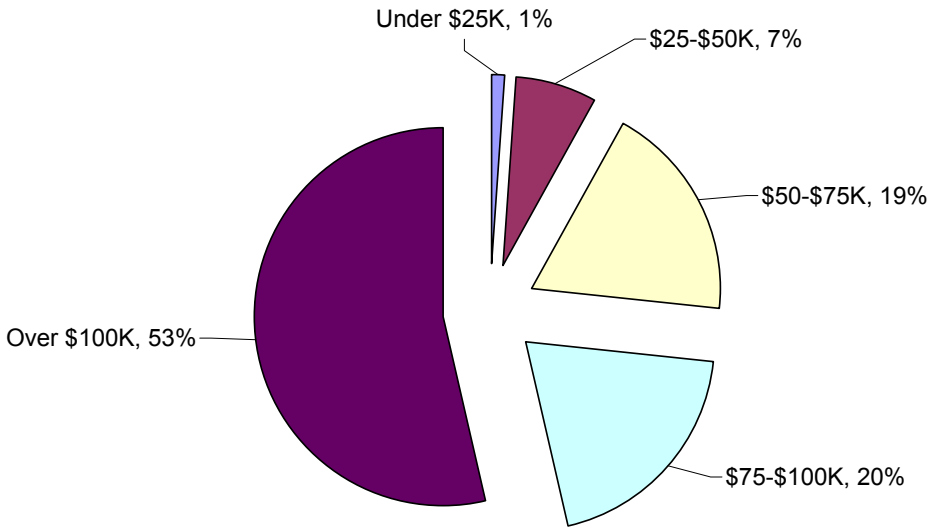
Age Distribution
Pooled Data



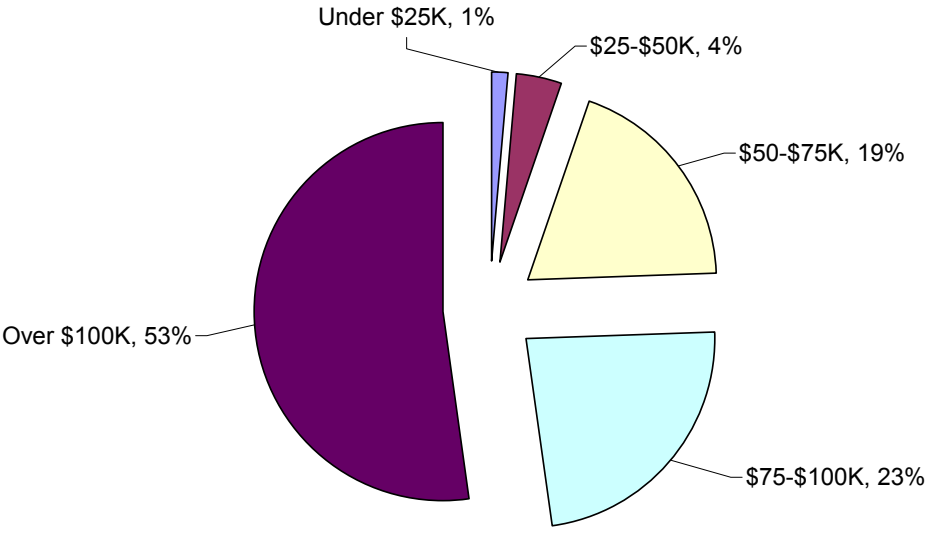
Income Distribution
County Group



Income Distribution
Lottery Group



Income Distribution
Pooled Data



As shown above, the lottery group appears to have more respondents in the older age groupings than the county group. This probably explains the large difference in the numbers with children living at home between the two groups.

The income distribution between the two groups is nearly identical. For comparison purposes, the U.S. Census reports a median household income in 1999 for Allegheny County of $39,328. Clearly, the buyers in both groups have more resources overall than a large majority of the general population in Allegheny County.

Conclusions and Recommendations

The research sheds some light on the preferences of consumers in the area surrounding Pittsburgh and how they compare to a group of buyers who were believed to be more innovative than the typical home buyer. The results also bring into question some long-held beliefs in the industry. These include:

- The catch-phrase "location, location, location" has been used frequently to describe what motivates home buyers. Although the results of this survey do not show that location or community issues are low on the list of motivating factors for buyers, there are house-related issues that rated just as high or higher. These include energy-efficiency, storage space, and a durable, low-maintenance exterior on homes. The highest rated community feature in the survey is the desire for high-quality schools.
- The interest in energy efficiency was evident throughout several questions presented in the survey. This suggests that a very large market of environmentally-conscious home buyers exists, since energy efficiency is frequently considered an environmental issue. However, the low preference for other items typically believed to be environmentally-friendly suggests that buyers may be more interested in energy efficiency because it affects their expenses directly. For example, the use of recycled or environmentally-friendly materials and being close to public transportation received much lower ratings from the respondents than did energy efficiency.
- The results fail to show that the lottery group, who were believed to be innovators, is driven by different preferences than the general population group. Thus, it is difficult to conclude from this study that a certain percentage of the population is more innovative and should be specifically targeted to market innovative technologies. Rather, the emphasis on marketing technologies should be placed on those technologies that relate to highly-rated benefits including energy efficiency, durability, and storage space.
- For specific technologies, those dealing with durability and energy efficiency were again the top rated items. This included brick exteriors, high efficiency heating and air conditioning equipment, and energy-efficient windows.
- The data show that I-joists, open-web trusses and other innovative structural systems are not high preferences for home buyers. This does not necessarily reflect a negative perception of these items. Rather, the data suggests that it may reflect the respondents being unfamiliar with the products or technologies. This could represent apathy because they just aren't as interested in the "behind the walls" part of the home as they are in the more visible parts, or it could reflect the likely fact that more effort by manufacturers to market these products has been focused on the contractor rather than the consumer.

Last, it should be noted that this research was focused on one market area. Care should be used in applying the results to other areas or to consumers on a national scale. It is recommended that PATH support other builders and developers from field evaluation or demonstration sites in formulating similar research plans to develop a broader understanding of the preferences of new home buyers.

Strategies for Marketing Innovative Technologies

Based on the results of this research, builders in the region surrounding Allegheny County could market innovative technologies by focusing on several highly-rated preferences of home buyers. Those technologies that conserve energy should be at the top of the list. Care should be taken to specifically relate the technology to the energy use in the home. For example, the use of a type of window could specifically make reference to the window's impact on energy use, not just the appearance or construction of the window.

Other technologies should specifically be related to durability/low maintenance and storage space. An example might include emphasizing how an engineered HVAC distribution system not only saves on the energy bill, but could also turn the attic into useable, conditioned space. Another example would be to show how a combined washer-dryer unit or an on- demand water heater can be used to create more usable storage space, in addition to other benefits the technologies may offer.

The strategies that emphasize energy efficiency, durability/low maintenance, or creation of additional storage space can not be used at the exclusion of other proven approaches to marketing of homes in general. More appropriately, these types of technologies should be useful additions to a marketing approach. If great local schools exist, these should continue to be selling points for homes.

Of the environmental issues this work explored with consumers, the energy and durability-related technologies rated highest. Some of the basic items frequently mentioned in the trade press as good green building techniques, including improved indoor air quality and use of recycled materials, were rated relatively low by consumers. Marketing of these types of items will first require extensive education. The same conclusion may be drawn for many other items or technologies that are hidden from the home buyer on an everyday basis, including innovative structural systems made from engineered products and advanced insulation products such as blown-in foam insulation.

With the items that require extensive education, it may be more appropriate to not focus general marketing of the homes on these technologies. Rather, the opportunity to educate and market buyers may be later in the process, during the selection of options or selection of specific product types. The survey results show that there is a market for these items, but that market is not nearly as large as for the energy and durability-related technologies. Relying on proven approaches to get the buyer to the table will allow the builder to then educate consumers on other technologies during negotiations. Another longer-term option would be for PATH and builders in the area to encourage manufacturers to undertake the marketing that will build up the public's awareness of specific technologies.

Last, the above recommendations for marketing of innovative technologies to potential new home buyers are designed to take advantage of items consumers rated highest among their preferences. However, the lower rated items still represent a significant market for a builder willing to take up the challenge of finding these buyers. Even the 10% to 20% of buyers who strongly preferred HRVs, mechanical ventilation, I-joists, or fiber-cement siding, can represent a niche large enough for practically any building company. Finding these innovators within the general population of prospective home buyers will be the challenge in taking a direct marketing approach with the lower rated technologies.

Appendix A

Survey Data

Lottery Group

Home and Community Benefits

Answers	storage space	energy efficiency	high speed internet	durable exterior	hard wood floors	largest home for money	plaster walls	recycled materials	lots of windows	public transportation or services	open space	recreation facilities	large or private yard	High quality schools
Very important, insist on it	31	42	18	59	28	30	12	9	38	20	28	23	24	40
Important, strongly desire	49	43	27	28	36	28	25	29	30	33	38	34	34	17
Like it, but not a priority	8	4	35	2	20	23	31	34	18	23	19	24	24	9
Not important	1	1	9	1	5	6	17	14	2	9	2	7	6	18
Prefer not to have	0	0	0	0	1	1	1	2	0	4	0	0	1	5
Total	89	90	89	90	90	88	86	88	88	89	87	88	89	89
Percentages														
Very important, insist on it	35%	47%	20%	66%	31%	34%	14%	10%	43%	22%	32%	26%	27%	45%
Important, strongly desire	55%	48%	30%	31%	40%	32%	29%	33%	34%	37%	44%	39%	38%	19%
Like it, but not a priority	9%	4%	39%	2%	22%	26%	36%	39%	20%	26%	22%	27%	27%	10%
Not important	1%	1%	10%	1%	6%	7%	20%	16%	2%	10%	2%	8%	7%	20%
Prefer not to have	0%	0%	0%	0%	1%	1%	1%	2%	0%	4%	0%	0%	1%	6%
total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

County Group

Home and Community Benefits

Answers	storage space	energy efficiency	high speed internet	durable exterior	hard wood floors	largest home for money	plaster walls	recycled materials	lots of windows	public transportation or services	open space	recreation facilities	large or private yard	High quality schools
Very important, insist on it	57	62	23	74	27	40	10	6	29	16	37	20	43	86
Important, strongly desire	56	56	39	49	47	53	19	26	65	39	57	63	61	23
Like it, but not a priority	12	8	44	3	35	27	43	56	28	35	28	35	19	7
Not important	2	0	19	1	16	6	47	38	5	35	3	9	4	10
Prefer not to have	0	0	1	0	2	0	7	1	0	2	1	0	0	1
Total	127	126	126	127	127	126	126	127	127	127	126	127	127	127
Percentages														
Very important, insist on it	45%	49%	18%	58%	21%	32%	8%	5%	23%	13%	29%	16%	34%	68%
Important, strongly desire	44%	44%	31%	39%	37%	42%	15%	20%	51%	31%	45%	50%	48%	18%
Like it, but not a priority	9%	6%	35%	2%	28%	21%	34%	44%	22%	28%	22%	28%	15%	6%
Not important	2%	0%	15%	1%	13%	5%	37%	30%	4%	28%	2%	7%	3%	8%
Prefer not to have	0%	0%	1%	0%	2%	0%	6%	1%	0%	2%	1%	0%	0%	1%
total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Lottery Group

Green Building

Familiar with green building?	
yes	33
No	52
Total	85
% Yes	39%
% No	61%
Total %	100.00%

Items that represent green building	
Large individual lots	15
High energy efficiency	71
Use of recycled materials	41
Water conserving fixtures	26
Energy efficient major appliances	20
Products with longer lifespans	10
Less reliance on automobiles	17
Sidewalks on both sides of streets	8
Large undisturbed areas of land	18
In-fill develoment	3
Improved indoor air quality	11
Mold/moisture resistant construction	12

% that represent green building	
Large individual lots	18%
High energy efficiency	85%
Use of recycled materials	49%
Water conserving fixtures	31%
Energy efficient major appliances	24%
Products with longer lifespans	12%
Less reliance on automobiles	20%
Sidewalks on both sides of streets	10%
Large undisturbed areas of land	21%
In-fill develoment	4%
Improved indoor air quality	13%
Mold/moisture resistant construction	14%

County Group

Green Building

Familiar with green building?	
yes	39
No	87
Total	126
% Yes	31%
% No	69%
Total %	100.00%

Items that represent green building	
Large individual lots	39
High energy efficiency	91
Use of recycled materials	54
Water conserving fixtures	37
Energy efficient major appliances	31
Products with longer lifespans	15
Less reliance on automobiles	6
Sidewalks on both sides of streets	17
Large undisturbed areas of land	38
In-fill develoment	10
Improved indoor air quality	12
Mold/moisture resistant construction	13

Large individual lots	35%
High energy efficiency	81%
Use of recycled materials	48%
Water conserving fixtures	33%
Energy efficient major appliances	28%
Products with longer lifespans	13%
Less reliance on automobiles	5%
Sidewalks on both sides of streets	15%
Large undisturbed areas of land	34%
In-fill develoment	9%
Improved indoor air quality	11%
Mold/moisture resistant construction	12%

Lottery Group

IAQ Preferences

	Air filtration	Outdoor air supply	Ceiling fans	Detached garage	Little Auto traffic	Attic exhaust	Minimal out-gassing	Wood Floors	Kitchen exhaust
Very important, insist on it	36	25	19	1	15	16	15	16	33
Important, strongly desire	35	34	27	6	38	33	40	31	38
Like it, but not a priority	17	22	30	20	25	27	25	26	14
Not important	1	5	9	25	8	12	8	14	4
Prefer not to have	0	0	3	35	2	1	0	1	0
Total	89	86	88	87	88	89	88	88	89
Percentages									
Very important, insist on it	40%	29%	22%	1%	17%	18%	17%	18%	37%
Important, strongly desire	39%	40%	31%	7%	43%	37%	45%	35%	43%
Like it, but not a priority	19%	26%	34%	23%	28%	30%	28%	30%	16%
Not important	1%	6%	10%	29%	9%	13%	9%	16%	4%
Prefer not to have	0%	0%	3%	40%	2%	1%	0%	1%	0%
total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

County Group

IAQ Preferences

	Air filtration	Outdoor air supply	Ceiling fans	Detached garage	Little Auto traffic	Attic exhaust	Minimal out-gassing	Wood Floors	Kitchen exhaust
Very important, insist on it	46	17	37	5	37	25	33	11	40
Important, strongly desire	47	57	49	13	54	42	51	31	58
Like it, but not a priority	29	45	24	24	28	39	33	49	22
Not important	5	7	14	35	5	20	9	25	5
Prefer not to have	0	0	3	48	2	0	0	10	2
Total	127	126	127	125	126	126	126	126	127
Percentages									
Very important, insist on it	36%	13%	29%	4%	29%	20%	26%	9%	31%
Important, strongly desire	37%	45%	39%	10%	43%	33%	40%	25%	46%
Like it, but not a priority	23%	36%	19%	19%	22%	31%	26%	39%	17%
Not important	4%	6%	11%	28%	4%	16%	7%	20%	4%
Prefer not to have	0%	0%	2%	38%	2%	0%	0%	8%	2%
total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Lottery Group

Energy Efficiency Options

	1st preference	2nd preference	3rd preference	4th preference
Test or calc	20	18	22	22
Cash reimb	26	17	16	23
Home ener	11	28	24	19
Energy Sta	25	19	20	18
Total	82	82	82	82

Test or calc	24%	22%	27%	27%
Cash reimb	32%	21%	20%	28%
Home ener	13%	34%	29%	23%
Energy Sta	30%	23%	24%	22%
% Total	100.00%	100.00%	100.00%	100.00%

County Group

Energy Efficiency Options

	1st preference	2nd preference	3rd preference	4th preference
Test or calc	17	32	28	35
Cash reimb	49	20	20	23
Home ener	23	32	33	24
Energy Sta	23	28	31	30
Total	112	112	112	112

Test or calc	15%	29%	25%	31%
Cash reimb	44%	18%	18%	21%
Home ener	21%	29%	29%	21%
Energy Sta	21%	25%	28%	27%
% Total	100.00%	100.00%	100.00%	100.00%

Lottery Group

Brand Identification

	Carpet	Roof shingles	Kitchen appliances	Bathroom sinks and tubs	Plumbing faucets and handles	Door locks and handles	AC/furnace	Hardwood flooring	Paint	Insulation	Windows	Exterior doors	Cabinets	Siding
Strongly prefer a brand name	15	22	68	34	39	18	50	15	27	30	53	22	22	21
Like a brand, would considerealternate	57	30	20	47	41	45	35	48	54	34	31	51	51	43
Brand not important, or don't know of one	17	37	1	8	9	26	4	26	8	25	5	16	16	24
Total	89	89	89	89	89	89	89	89	89	89	89	89	89	88

Strongly prefer a brand name	17%	25%	76%	38%	44%	20%	56%	17%	30%	34%	60%	25%	25%	24%
Like a brand, would considerealternate	64%	34%	22%	53%	46%	51%	39%	54%	61%	38%	35%	57%	57%	49%
Brand not important, or don't know of one	19%	42%	1%	9%	10%	29%	4%	29%	9%	28%	6%	18%	18%	27%
% Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

County Group

Brand Identification

	Carpet	Roof shingles	Kitchen appliances	Bathroom sinks and tubs	Plumbing faucets and handles	Door locks and handles	AC/furnace	Hardwood flooring	Paint	Insulation	Windows	Exterior doors	Cabinets	Siding
Strongly prefer a brand name	36	28	108	47	59	33	79	29	49	36	79	44	31	35
Like a brand, would considerealternate	74	67	18	66	63	66	43	65	62	68	45	64	70	61
Brand not important, or don't know of one	17	32	1	14	5	28	5	33	16	23	3	19	25	30
Total	127	127	127	127	127	127	127	127	127	127	127	127	126	126
Strongly prefer a brand name	28%	22%	85%	37%	46%	26%	62%	23%	39%	28%	62%	35%	25%	28%
Like a brand, would considerealternate	58%	53%	14%	52%	50%	52%	34%	51%	49%	54%	35%	50%	56%	48%
Brand not important, or don't know of one	13%	25%	1%	11%	4%	22%	4%	26%	13%	18%	2%	15%	20%	24%
% Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Lottery Group

Specific Technologies

	Spray-applied insulation	Basement drainage and insulation	Wood I-joists	Open web trusses	Mechanical ventilation	Heat recovery ventilator	High efficiency windows	High efficiency furnace and AC	Brick	Fiber cement siding
Strongly-prefer	21	14	19	13	20	17	63	84	74	17
No strong desire or objection	25	21	20	19	28	28	16	3	13	20
Not familiar with	37	47	44	53	36	39	9	1	1	39
Would not want	5	3	2	0	2	3	1	0	1	12
	88	85	85	85	86	87	89	88	89	88
Strongly-prefer	24%	16%	22%	15%	23%	20%	71%	95%	83%	19%
No strong desire or objection	28%	25%	24%	22%	33%	32%	18%	3%	15%	23%
Not familiar with	42%	55%	52%	62%	42%	45%	10%	1%	1%	44%
Would not want	6%	4%	2%	0%	2%	3%	1%	0%	1%	14%
	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

County Group

Specific Technologies

	Spray-applied insulation	Basement drainage and insulation	Wood I-joists	Open web trusses	Mechanical ventilation	Heat recovery ventilator	High efficiency windows	High efficiency furnace and AC	Brick	Fiber cement siding
Strongly-prefer	22	36	19	16	22	21	71	106	89	16
No strong desire or objection	61	33	42	36	50	43	38	17	33	32
Not familiar with	24	48	51	61	49	56	12	1	2	57
Would not want	17	5	12	11	2	3	2	1	2	18
	124	122	124	124	123	123	123	125	126	123
Strongly-prefer	18%	30%	15%	13%	18%	17%	58%	85%	71%	13%
No strong desire or objection	49%	27%	34%	29%	41%	35%	31%	14%	26%	26%
Not familiar with	19%	39%	41%	49%	40%	46%	10%	1%	2%	46%
Would not want	14%	4%	10%	9%	2%	2%	2%	1%	2%	15%
	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Lottery Group

General Information

Children in home?	
Yes	35
No	55
Total	90
% Yes	39%
% No	61%
% total	100.00%

Age group	
Under 30	6
30-40	27
41-50	18
51-60	25
Over 60	14
Total	90
Under 30	7%
30-40	30%
41-50	20%
51-60	28%
Over 60	16%
% Total	100.00%

Family income	
Under $25K	1
$25-$50K	6
$50-$75K	16
$75-$100K	17
Over $100K	46
Total	86
Under $25K	1%
$25-$50K	7%
$50-$75K	19%
$75-$100K	20%
Over $100K	53%
Total	100.00%

County Group

General Information

Children in home?		Age group		Family income	
Yes	100	Under 30	5	Under $25K	2
No	27	30-40	68	$25-$50K	2
Total	127	41-50	39	$50-$75K	23
		51-60	11	$75-$100K	31
% Yes	79%	Over 60	4	Over $100K	61
% No	21%	Total	127	Total	119
% total	100.00%				
		Under 30	4%	Under $25K	2%
		30-40	54%	$25-$50K	2%
		41-50	31%	$50-$75K	19%
		51-60	9%	$75-$100K	26%
		Over 60	3%	Over $100K	51%
		% Total	100.00%	Total	100.00%

Appendix B

Homebuyer
Survey Instrument

Dear Homeowner:

We are participating with the Department of Housing and Urban Development in a survey to identify the features that consumers want in their homes. Because of your interest in Summerset at Frick Park, we would like to get your feedback.

In exchange for a few minutes of your time, we will enter your name into a drawing for a $200 gift certificate from LL Bean. Simply fill out and return this survey in the pre-addressed postage paid envelope. We pledge to keep your individual answers confidential and will not call or try to sell you anything.

Thanks for your assistance.

Sincerely,

Mark Schneider
Summerset at Frick Park

August 2003

Name: _____ **Address:** _____

Part 1 – Home or Community Benefits

The following characteristics are often identified as important by buyers in their decision to purchase a new home. Please circle the letter beside each item that best describes how important each item is to you as follows.

a = This item is very important to me and I would insist on it in my new home or community.

b = This item is important to me and I would strongly desire it in my new home or community.

c = I would like to have this item, but it is not a high priority for me.

d = This item is not important to me.

e = I prefer that this not be part of my new home or community.

Items in home

1.	Extensive amount of storage space	a	b	c	d	e
2.	High levels of energy efficiency	a	b	c	d	e
3.	High-speed internet throughout the home	a	b	c	d	e
4.	Low maintenance, durable exterior	a	b	c	d	e
5.	Hardwood flooring	a	b	c	d	e
6.	Largest size home for my money	a	b	c	d	e
7.	Plaster walls versus drywall	a	b	c	d	e
8.	Recycled or environmentally-friendly building materials	a	b	c	d	e
9.	Lots of windows	a	b	c	d	e

Community items

1.	Convenient to public transportation or services	a	b	c	d	e
2.	Preservation of open space	a	b	c	d	e
3.	Nearby recreational facilities	a	b	c	d	e
4.	Large or otherwise private yard	a	b	c	d	e
5.	High quality schools	a	b	c	d	e

Part 2 – Green Building

1. Prior to this survey, were you familiar with the term "green building?" (circle yes or no) Yes No

2. Circle the letter beside any three items below that you believe best represent "green-building" in a home or community. **Only circle your top three.**

   a. Large individual lots with widely-spaced homes
   b. Highly energy efficient home
   c. Use of recycled materials
   d. Water conserving fixtures
   e. Highly energy efficient major appliances
   f. Products with longer life spans
   g. Less reliance on automobile
   h. Sidewalks on both side of streets
   i. Large undisturbed areas of land
   j. In-fill development using empty lots in otherwise built-up areas
   k. Improved indoor air quality
   l. Mold/moisture resistant construction

3. Please circle the letter beside each item that best describes your preference for them in your home to improve indoor air quality.

a = This item is very important to me and I would insist on it in my new home or community.

b = This item is important to me and I would strongly desire it in my new home or community.

c = I would like to have this item, but it is not a high priority for me.

d = This item is not important to me.

e = I prefer that this not be part of my new home or community.

Item					
Air filtration or cleaner	a	b	c	d	e
Continuous supply of outdoor air to the home	a	b	c	d	e
Ceiling fans	a	b	c	d	e
Detached garage rather than attached garage	a	b	c	d	e
Locate in an area with little auto traffic	a	b	c	d	e
Attic exhaust fan(s)	a	b	c	d	e
Products that have minimal out-gassing of chemicals	a	b	c	d	e
Wood floors throughout entire home	a	b	c	d	e
Kitchen exhaust (range hood ducted to outside)	a	b	c	d	e

4. The performance of your home is a complicated issue. Below are options that can provide a level of assurance that your home will perform within certain expectations. Rank the items below from 1 to 4, with 1 being most valuable and 4 least valuable. **Use each number from 1 to 4 only once.**

Option	Rank
1. Test results or calculations from the architect or designer estimating expected energy use of your home.	_____
2. A cash reimbursement guarantee that will pay a portion of your energy bill that exceeds a certain annual amount for the first year or two	_____
3. A home energy rating prepared by an independent consultant that shows how your home compares to others on a scale from 1 to 100	_____
4. An EPA Energy-Star label that shows your home exceeds energy code requirements by at least 30%	_____

Part 3 – Brand Identification

Rate each item with a 1, 2, or 3 as follows:

1 = I would **strongly prefer** a brand name that I recognize for this product.

2 = I would like to have a brand name that I recognize for this product, but would **consider an equivalent**.

3 = A brand name for this product is **not important to me**, or **I don't know of any** for this product.

Carpet	_____	Hardwood flooring	_____
Roof shingles	_____	Paint	_____
Kitchen appliances	_____	Insulation	_____
Bathroom sinks and/or tubs	_____	Windows	_____
Plumbing faucets/handles	_____	Exterior doors	_____
Door locks/handles	_____	Cabinets	_____
Air conditioner/furnace	_____	Siding	_____

Part 4 - Specific Technologies

For the following technologies or features, circle the letter corresponding to the answer that best describes your view of the item as follows:

a = I am convinced of the benefits of this item and strongly prefer it in my home.

b = I have no strong desire to have this in my home, nor would I object to it.

c = I am not familiar with this item.

d = I would not want this item in my home.

	Item				
1.	Spray-applied foam insulation (versus fiberglass insulation)	a	b	c	d
2.	Exterior basement drainage and insulation system (versus outside drain and insulation on inside of the wall.)	a	b	c	d
3.	Wood I-joists for floor framing (versus 2x10 or 2x12 wood joists.)	a	b	c	d
4.	Open web trusses for floor framing (versus 2x10 or 2x12 wood joists.)	a	b	c	d
5.	Mechanical ventilation system (versus natural infiltration)	a	b	c	d
6.	Heat recovery ventilator (versus untreated fresh air supplied to the home)	a	b	c	d
7.	High efficiency (Low E and gas-filled) windows	a	b	c	d
8.	High-efficiency furnace and air conditioner	a	b	c	d
9.	Brick exterior (versus vinyl siding)	a	b	c	d
10.	Fiber-cement siding on the exterior (versus vinyl siding)	a	b	c	d

Part 5 - General Information

Circle one answer for each question

1. Do you have children living at home? Yes No

2. What age group do you fall in?
   Under 30 30 – 40 41-50 51-60 Over 60

3. Circle the range that best describes your annual family income
   Under $25,000 $25,001-$50,000 $50,001- $75,000
   $75,001-$100,000 Over $100,000

4. Is this home owner-occupied (as opposed to a rental unit)? Yes No

5. Are you the original owner of your current home? Yes No