EVALUATION REPORT

for the

MOBILE HOME NEW CONSTRUCTION PROGRAM

in

Kentucky Power Company

Program Period: January 2003 - December 2004

Resource Planning & Economic Forecasting
Corporate Planning & Budgeting Department
American Electric Power

August, 2005

TABLE OF CONTENTS

I. EXECUTIVE SUMMARY

This report summarizes the results of the process evaluation, load impact evaluation, and cost/benefit evaluation for the years 2003-2004 of Kentucky Power Company's (KPCo or Company) Residential Mobile Home New Construction Program (MHNC). The MHNC Program, initiated by the Kentucky DSM Collaborative, has been successfully implemented in the American Electric Power (AEP) Kentucky service area since 1996. This report presents the evaluation results for 2003 – 2004 while supporting the continuation of the program beyond 2005, and at the same time, proposing to discontinue the promotion of the 12 SEER high efficiency central air conditioning systems.

In the Kentucky Power service territory, approximately one third of all new construction consists of manufactured homes (commonly referred to as mobile homes or HUD code homes). Typically, new mobile homes have heating, ventilation, and air conditioning (HVAC) systems consisting of an electric central furnace and a central air conditioning unit (see Appendix A). Kentucky Power's Mobile Home New Construction Program was designed to investigate the energy impacts of alternative heating/cooling systems and improved envelope efficiency design and construction. The program was designed to investigate the marketing of new mobile homes in the KPCo service area, primarily focusing on the potential impact of the installation of high efficiency heat pumps in place of resistance heat and standard efficiency central air conditioning (AC) systems and of improved insulation levels in the building structure.

During the evaluation period (2003-2004), the Company continued the promotion of the program through mobile home dealerships with incentives paid to both the dealer and the customer who purchased a new mobile home with a high efficiency heat pump / air-conditioner and a Zone 3 insulation package. The customer / dealer incentive for the installation of a high efficiency heat pump / air-conditioner were $500/$50 and $125/$25 respectively. The program was implemented

through twenty (20) mobile home dealerships with 110 customers purchasing a high efficiency heat pump and 1 customer purchasing a high efficiency central air-conditioner in 2003 and 138 customers purchasing a high efficiency heat pump and 1 high efficiency central air-conditioner in 2004.

A follow-up survey conducted by MQA Research (MQA) during June 2002 to a randomly selected sample of MHNC program participants showed high levels of satisfaction among the participants with their new heat pumps, with the heat pump installer, and with the program rebate level. Approximately nine-out-of-ten of the program participants surveyed said they were "very satisfied" with all aspects of the program. The survey also indicated approximately twenty percent (17%) of freeriders participating in the program.

In the evaluation of the load impacts of the program, the load research data collected from the HVAC systems monitored during the first phase of the program, together with the participants' billing data, and installation information gathered from the 250 new mobile homes sold during 2003-2004 were used to estimate the program's total energy and demand impacts. The estimated load impacts, and the actual and anticipated program and participants' incremental costs are used to perform the cost/benefit evaluation for the program.

The results of 2003–2004 program evaluation showed the MHNC Program has significantly reduced participants' electric consumption and it was cost-effective based on the Total Resource Cost (TRC), Utility Cost (UC) and Participant (P) economic tests. The program's total annual energy savings was estimated at 1,903 MWh based on the 250 actual participants for 2003 and 2004 and 150 estimated participants for 2005 in the program. The MHNC program total net annual energy saving was estimated to be 1,580 MWh (including 10% Transmission and Distribution Loss Savings and estimated 17% of program freeriders.). The total net demand reduction was estimated to be 976 kW in Winter and 46.5 kW in Summer (including 11% Transmission and Distribution Loss Savings and 17% of freeriders.).

II. TECHNOLOGY DESCRIPTION

Kentucky Power's Mobile Home New Construction Program was designed to investigate the energy impacts of alternative heating/cooling systems and improved envelope design and construction. The program was designed to investigate the marketing of new mobile homes in the KPCo service area, primarily focusing on the potential impact of the installation of high efficiency heat pumps in place of resistance heat and standard efficiency central air conditioning systems and of improved insulation levels in the building structure. Approximately one third of all the Company's residential electric space heating customers live in mobile homes. Furthermore, many of these mobile homes are heated and cooled by relatively inefficient HVAC systems. Significant efficiency gains in the HVAC systems can be obtained by installing high efficiency heat pumps or high efficiency central AC in new mobile homes when they are manufactured, along with upgrading the insulation levels which improve the home's envelope efficiency. These high efficiency measures provide optimum levels of cost-effective energy efficiency design and construction features for new mobile homes, which improve the energy performance, comfort, livability and affordability of new manufactured homes. Installing these measures after the mobile home has been constructed increases the costs significantly and results in a loss opportunity of marketing high efficiency in the mobile home industry.

Heat Pumps:

Heat pumps are the most energy efficient home heating and cooling technology available in today's market. The basic concept of a heat pump can be described as a mechanical device that pumps heat from a cooler to a warmer location. Even in cold temperatures, the outside air contains some level of heat that can be utilized. During the winter, heat is extracted from the outside air and is pumped into the dwelling. In the summer, the system is reversed and the heat is removed from the indoor air and delivered to the outside. Heat pumps include a supplemental resistance heater that

automatically provides additional heat when outdoor temperatures are too low for the heat pump to supply the total heating load.

Most of the significant energy savings from the heat pump are obtained during the heating season since it utilizes the heat that already exists in the air. The heat pump efficiency is determined by the seasonal energy efficiency ratio (SEER) for the summer and the heating seasonal performance factor (HSPF) for the winter. These are defined as follows:

$$\text{SEER} = \frac{\text{Total cooling provided during cooling season (BTU's)}}{\text{Total energy consumed by the system (Watt-hours)}}$$

$$\text{HSPF} = \frac{\text{Total heating provided during heating season (BTU's)}}{\text{Total energy consumed by the system (Watt-hours)}}$$

High Efficiency Central Air Conditioning:

The energy savings from high efficiency central AC are obtained during cooling season by upgrading central air conditioning from 10 SEER to 12 SEER.

Insulation Levels:

The transfer of heat flow between a home's structure and its outside environment can be retarded by increasing the insulation in the home's walls, ceiling and floor and other building components. The rate of heat transmitted through the home by air is measured by the term, coefficient of heat transmission, U, defined as follows:

U = air-to-air overall coefficient of heat transmission through the surface of building components such as walls, ceiling, floor, etc. (Btu/h x sq.ft. x F)

The U-value is directly related to the amount of heat loss and heat gain through the building and is used by manufacturers to rate the building's envelope efficiency. The smaller the U-value, the more efficient the building because it reflects a decrease in the rate of heat flow through the building components.

By increasing the insulation level in building components, the rate of heat transfer between the home's structure and outside environment decreases, thus increasing the building's envelope efficiency. This reflects a decrease in the rate of heat gain through the building in the summer and heat loss through the building in the winter. As a result, the building's HVAC system will not use as much electrical energy to maintain the comfort level of the home.

Mobile home manufacturers must meet U-value level requirements pertaining to various HUD Zone areas under the New Manufactured Housing Construction and Safety Standards. The HUD Zones, which pertain to geographical areas across the United States, specify a U-value zone maximum coefficient of heat transmission. The manufacturer must be able to design and construct the mobile home to meet zone requirements. There are three zones, with Zone 3 pertaining the highest envelope efficiency.

III. PROGRAM DESCRIPTION

Program Overview:

The Mobile Home New Construction Program (MHNC) was designed to study the market for new mobile homes within the Kentucky Power service territory and to determine the energy implications of current design and installation practices. The MHNC Program, initiated by the Kentucky DSM Collaborative, has been successfully implemented in the KPCo service area since 1996. During the first phase of the program, (April 1996 through March 1997), HVAC system loads were monitored with load research meters on three new mobile homes of different HUD codes situated at the KPCo Coal Run service facility in Pikeville, Kentucky. These HUD code test site mobile homes differed from the other, either by the type of HVAC system or the building insulation levels or both. The normalized energy savings between two similar mobile homes equaled 310 kWh in the summer months, 4,376 kWh in the winter months, and 4,686 kWh annually. The savings reflect the result of the more efficient heat pump compared to the electric central furnace and the central air conditioner.

In the second phase of the program, during 1997 and 1998, Kentucky Power's Demand Side Management Collaborative promoted the program directly to mobile home dealerships operating within the KPCo service territory. A $50 promotional incentive was provided to participating dealerships for each mobile home sold with a high efficiency heat pump and an upgraded insulation package. In order to qualify for the incentive, aside from the Zone 3 insulation package, the efficiency rating of a split system heat pump had to be at a minimum of 11.0 SEER or 7.2 HSPF and for a package system heat pump, 10.0 SEER and 6.8 HSPF. A $500 incentive was provided to the buyer of the mobile home to offset the incremental costs of upgrading the home's insulation package and HVAC system. Mobile homes with Zone 3 insulation packages had the highest envelope efficiency, which included a high efficiency heat pump system and upgraded insulation levels. A

detailed evaluation report on the findings from the first period of program implementation ("Mobile Home New Construction Program Final Evaluation Report 1996-1998") was issued August, 1999.

During the three-year extension of the program between 2003-2005, the DSM Collaborative continued to promote the program through mobile home dealerships with incentives paid to both the dealer ($50) and the customer ($500) who purchased a new mobile homes with a high efficiency heat pump and a Zone 3 insulation package. The program was implemented through twenty mobile home dealerships with 110 customers purchasing a high efficiency heat pump during 2003 and 138 customers purchasing a high efficiency heat pump during 2004.

In view of a potential of loss opportunity in improving cooling energy efficiency in the mobile home new construction market, the DSM Collaborative added an incentive for installing a high efficiency AC measure in the MHNC program. Beginning January 1, 2003, the program paid $25 to the dealer and $125 to the customers who purchased a new mobile home with a high efficiency central AC equal to or exceeding 12 SEER. Participation levels for the high efficiency air-conditioning measure were well below anticipated levels. Only 2 customers purchased a high efficiency air-conditioning system during 2003-2004 evaluation period. Participating manufactured housing dealerships are not promoting the 12.0 SEER air-conditioning systems due to the increased cost.

The KPCo DSM Collaborative is requesting Kentucky Public Service Commission (KPSC or Commission) approval to discontinue this measure at the end of the 2005 calendar year due to lower than expected participation levels and the revised federal energy efficiency standards that are scheduled to go into effect on January 23, 2006.

On April 14, 2005, the Department of Energy's Office of Hearing and Appeals (OHA) granted Nordyne's application for exception relief from the 2006 13.0 SEER requirement for split system air-conditioners of the 3 to 5 ton capaciity. The OHA granted Nordyne's application, which

in effect would permit a 12 SEER air-conditioning system to be installed in HUD-Code homes until January 1, 2010. Only Nordyne 12.0 SEER air-conditioning systems will be allowed to be installed in HUD-Code homes. Since 70% of the manufactured housing dealers use Nordyne equipment, this exception eliminates any possibility of upgrading air-conditioning systems next year. Therefore, the DSM Collaborative is recommending the measure for high efficiency air-conditioning be discontinued effective January 1, 2006.

Rationale for Program:

A substantial percentage of new residential construction in the KPCo service territory consists of manufactured homes, also known as HUD code or mobile homes. The goal of the program is to determine the load impacts of various design and construction features of newly constructed mobile homes and alternative heating/cooling systems and the marketability of the new mobile home design.

Program Promotion:

The program participants were secured through direct-customer contact by participating mobile home dealerships during the 2003-2004 program evaluation. The Company was successful in achieving 250 participants by the end of second year of the three-year extension. Table 1 summarized the annual participation of the program.

Table 1: Annual Participation

Year	Heat Pump	A/C	Total
2003	110	1	111
2004	138	1	139
	248	**2**	**250**

Program Implementation:

The program was implemented through 20 participating mobile home dealerships (Exhibit 1). The dealers provided each potential buyer a brochure describing the program (Exhibit 2). The

dealers provided the Company with customer installation reports on a periodic basis (shown in Appendix B). The incentive payment for the dealer and the buyer was compiled from these reports.

IV. DATA COLLECTION

The survey responses from the AEP 2000 Residential Customer Survey conducted in the summer of 2000 in the Kentucky Power service area were utilized to analyze the mobile home new construction market. The results of the AEP 2000 Residential Customer Survey served as a basis to define the potential market segments, and the future penetration and/or expansion of the program. The results from AEP 2000 Residential Customer Survey are presented in Appendix A. A follow-up survey of 50 randomly selected participants in the KPCo service area was conducted by MQA Research in June 2002. The follow-up survey was used to determine why customers chose to participate in the program and to provide information used to estimate freeriders among participants. The follow-up survey was also used to determine customer satisfaction with the performance of new heat pump operation, the service performed by the heat pump installer, and overall satisfaction with the rebate level of the program. The results from the follow-up survey are presented in Appendix B.

For all participants in the evaluation period (2003-2004), a data collection form was used to record information for each mobile home sold having a Zone 3 insulation package. The form was completed by the dealership which included information on the dealership, the home buyer, the home size and characteristics and description of the HVAC equipment contained in the mobile home. A copy of the form is included in Appendix C, along with the tabulation of some of the data collected. The dealership and customer information was used to track where the mobile homes were sold, the location where they were installed, the purchase and delivery date, and verification of the Zone 3 insulation package sold to qualify for the incentives. Detailed information on the home size and HVAC system in each mobile home sold was used to estimate the energy savings projected as a result of selling the high efficiency Zone 3 unit compared to a standard Zone 2 unit that is less efficient. This information was incorporated with the results of load data monitoring from the three test site mobile homes in the first phase of the program to develop the projected engineering

estimated energy savings and demand reduction for the 2003-2004 program participants. No new load research metering data on test sites were collected during the evaluation period of 2003-2004 However, energy consumption of participants after the date of heat pump installation was retrieved from the Company's billing history database. The post installation billing information, along with engineering estimated energy savings and weather data on heating and cooling degree days obtained from the National Oceanic and Atmospheric Administration, were used to develop the final estimates of the load impacts of the MHNC Program. Information collected in the follow-up survey served as a basis to estimate freeriders.

V. PROCESS AND MARKET EVALUATION

Process:

The program's implementation during the first two years of the three-year extention period (2003-2004) consisted of securing program participants through direct-customer contact by twenty (20) participating mobile home dealerships (Exhibit 1). Potential buyers were provided a brochure (Exhibit 2) describing the program, which explained the incentives offered for purchasing a new mobile home with a high efficiency heat pump and upgraded insulation package which is a Zone 3 unit. The dealers provided the Company with customer installation reports (Appendix C) from which incentive payments were made to the dealers and customers. 250 customers participated in the program between the years of 2003-2004, and an estimate of 150 participants is expected for 2005.

Process Analysis

The process analysis of the MHNC Program utilized the installation data, recruitment tracking data, results from follow-up survey to evaluate the delivery mechanism, promotional effectiveness, and customer satisfaction.

Delivery Mechanism: Kentucky Power Company utilized the new mobile home dealers/salesman and the Company DSM program cooordinator to administer the program.

Promotional Effectiveness: Based on the follow-up survey, mobile (manufactured) home salesmen were the main source (56%) for the program awareness to the participants. Additionally, 26% of the participants indicated that they first became aware of the program through friends or relatives. Therefore, "word-of-mouth" was still an effective source of information on the MHNC Program.

Customer Satisfaction: As participants indicated in the follow-up survey, overall satisfaction with the MHNC Program was very high, with 70% of the respondents indicating that they are very satisfied with the rebate level provided by the program. Almost nine out of ten (86%) of the

respondents indicated that they were "very satisfied" with the performance of the high efficiency heat pump. When asked about the service provided by the heat pump installer, 74% of the participants indicated they were "very satisfied".

Market Analysis

In the analysis of the marketing of the MHNC Program, the product awareness, effectiveness of incentives, freeridership, market penetration and market potential were examined. Results from, the follow-up survey and AEP 2000 Residential Customer Survey were utilized to perform the market analysis.

Product Awareness: Customer's awareness of the product of a heat pump is very high. Based on the follow up survey, 84% of the participants had planned on purchasing and installing a high efficiency heat pump prior to participating in the program. However, the awareness of upgrading insulation is lower, only 52% of the participants planned on purchasing insulation for their new homes.

Effectiveness of Incentives: Customers participating in the program resulted from Kentucky Power Company's rebate of $500 offered toward the cost of a new heat pump and Zone 3 insulation. However, when participants were asked how likely would they have been to install a heat pump if there was not a rebate, about two-thirds (66%) said they are likely to install a heat pump without a rebate. Close to one-half (44%) said they are likely to purchase the upgraded insulation package without a rebate. In addition, almost all participants (90%) are either very satisfied (70%) or somewhat satisfied (20%) with the rebate level, indicating the incentive level is not a concern for program participation.

Freeridership: To identify the freeriders, which were customers who had planned to install a heat pump in the absence of this program, some cross tabulations of survey questions were necessary. It was assumed that a customer who had planned on purchasing and installing a high-

efficiency heat pump prior to participating in the MHNC Program and who was somewhat likely or very likely to install a heat pump without a rebate, and who had planned on purchasing insulation for the new home prior to participating the MHNC Program and who was somewhat likely or very likely to purchase the upgraded insulation package without a rebate, was a freerider in the program. Based on this assumption, 17% of participants were identified as freeriders in this program.

Market Potential: From the follow up survey, a majority of participants cited "to save money" or "to save energy" (32% and 24%, respectively) as the main reasons for participating in the MHNC Program and they also indicated high awareness of the heat pump and upgraded home insulation and a high satisfaction with the heat pump performance. Therefore, it was concluded that there is still a significant market potential for this program.

VI. IMPACT EVALUATION

Findings:

Based on the first two-years of the three-year extension (2003-2004) of the MHNC Program with 250 participants, the net total annual energy savings was estimated to be 1,580 MWh (which includes 10% Transmission and Distribution loss savings and 17% of program freeriders). On average, each participant was estimated to experience an annual energy savings of approximately 4,758 kWh at the meter. The net total demand reduction was 976 kW in winter and 46.5 kW in summer (including 11% Transmission and Distribution loss savings and 17% of program freeriders). These impacts resulted from demand reductions per participant of 2.94 kW and 0.14 kW at the meter in winter and summer, respectively. Table 2 summaries the entire MHNC program load impacts.

Table 2: Average Load Impacts for MHNC Program

	2003 - 2004 MHNC Participants
Annual Energy Savings/Participant	4,758 kWh
Winter Demand Reduction/Participant	2.94 kW
Summer Demand Reduction/Participant	0.14 kW
Net Total Annual Energy Savings(1)	1,579,660 kWh
Net Winter Demand Reduction(2)	976 kW
Net Summer Demand Reduction(2)	46.5 kW
(1) Includes 10% Transmission and Distribution Loss Savings (2) Includes 11% Transmission and Distribution Loss Savings	

Energy Impact Analysis:

The energy savings estimate was calculated from an Statistical Adjusted Engineering (SAE) Model utilizing results of the load research data collected at the KPCo Coal Run service facility during the first phase of the program. The load research data was used to estimate the unknown heat losses and heat gains of the mobile homes tested at the KPCo Coal Run service facility and were applied to ASHRAE's (American Society of Heating, Refrigeration and Air-Conditioning Engineers) Heating and Cooling Degree Day Models to estimate the heating and cooling energy savings for the

participants in the 2003-2004 program evaluation period. The heat losses and heat gains are input variables for the Heating and Cooling Degree Day Models that reflect the thermal characterisitics of the mobile home. Additionally, the mobile home size, indoor and outdoor temperature differences, heating and cooling degree days and heating/cooling system efficiency are also inputs into the models. The ratio of mobile home size for program participants versus the mobile home size at the test facility was used to adjust the heat losses and heat gains accordingly to reflect the adjusted energy savings for the program participants between 2003 to 2004. Appendix D gives the details of the Energy Impact Analysis based on engineering estimates. The result of the analysis was input into a data base to calculate the average percentages of energy savings for each participant. The engineering estimates of energy savings for an average 2003-2004 participant from the heat loss/heat gain analysis are shown in Tables 3.

Table 3: Average Energy Saving kWh/Participant Based on Engineering Estimate

	Electric Furnace / Central AC To High Efficiency Heat Pump 2003 - 2004
Heating	5,826
Cooling	167
Total	**5,993**

The engineering estimated energy savings were further refined by the actual participant's post-installed billing energy consumption. The post-installation monthly energy consumption of participants was retrieved from a billing history tape. The average annual post-installation heating and cooling seasonal billed usages were estimated and then weather-normalized to represent average normal weather conditions in the Kentucky region. Table 4 shows the normalized post-installation consumption for the cooling and heating seasons for an average participant.

The percentage of energy savings from the engineering analysis of the electric central furnace and standard efficiency air conditioning system versus the new heat pump system was

applied to the normalized consumption to arrive at an adjusted engineering estimate savings for each participant in the MHNC Program (see Table 4). The average total energy savings was 4,758 kWh of which 4,659 kWh was heating savings and 99 kWh was cooling savings.

Table 4: Average Energy Consumption-Based on Post-Installation Billing Data

	High Efficiency Heat Pump / Zone 3 Insulation
Average Billed Usage	
Winter Month Total	9,803 kWh
Summer Month Total	5,300 kWh
Annual Total	15,103 kWh
Annual Percentage of Usage for Heating & Cooling	
Heating	39.4%
Cooling	10.8%
Seasonal Billed Usage	
Heating	5,957 kWh
Cooling	1,623 kWh
Weather Normalized Seasonal Billed Usage	
Heating	7,266 kWh
Cooling	1,524 kWh
% of Seasonal Energy Savings	
Heating	36.6%
Cooling	7.7%
Estimate of Seasonal Energy Savings	
Heating	4,659 kWh
Cooling	99 kWh
Total	**4,758** kWh

Demand Impact Analysis:

The demand reduction was estimated based on results of AEP internal studies that made a comparison of load characteristics between a high efficiency heat pump system and an electric central furnace and air conditioning system. These studies had incorporated information gathered from AEP system-wide heat pump end-use metering data, which also included data on KPCo customers. The seasonal demand reductions are estimated based on seasonal load factors derived from from the end-use load data, along with seasonal hours of use. This information was incorporated with the seasonal energy savings for the Mobile Home New Construction Program to determine the heating and cooling demand reductions. The results are summarized in Appendix E.

VII. COST/BENEFIT EVALUATION

Results:

Cost/benefit analyses of DSM programs may be performed using either an historical basis or a prospective basis. From an historical basis, actual costs and load impacts for DSM programs participants during an historical period (such as the first year of a program) are utilized to assess the net benefits. The net benefits may be calculated over a 20-year period for the first year's participants. These are after-the-fact analyses which could be utilized to determine the cost-effectiveness of previous activity, but may not by representative of the future and therefore, should not be the basis for DSM program decision-making.

Cost/benefit analyses from a prospective basis anticipate future DSM program participation, costs and impacts. These analyses expand upon actual field experience (cost, impact, etc.) to estimate the net benefit from projected implementation in the future. The foundation of DSM program knowledge serves as a basis to estimate projected costs, impacts, etc. This is the real value of field experience: applying what has been learned to guide decisions on future DSM program implementation. Cost/benefit analyses were performed on the MHNC program with the existing measures of high efficiency heat pump, high efficiency air conditioning, and Zone 3 insulation.

The benefit/cost (B/C) ratios for the 2003 - 2004 Mobile Home New Construction Program are significantly higher than the benefit/cost ratios seen in previous program evaluations. The primary drivers for the increased B/C ratios were increased fuel costs and increased emission rates. A decrease in On Peak and Off Peak system sales utilization negatively affected the B/C ratios for the program.

The 2002 and 2005 input data files were examined and later compared to determine which files had significant impacts (greater than 0.1 impact) on the B/C ratios for the program. The files that consistently drove this magnitude of change were the marginal cost, emissions, and the system

sales files. For High Efficiency Heat Pump and Zone 3 Insulation, based on 2002 input files, the Total Resource Cost test results for marginal costs and emission costs improved 0.97 and 2.27 respectively. The Total Resource Cost test results for system sales utilization decreased 0.29. For High Efficiency Air Conditioning, based on 2002 input files, the Total Resource Cost test results for marginal costs and emission costs improved 0.33 and 3.44 respectively. The Total Resource Cost test results for system sales utilization decreased 0.13.

MHNC Program with High Efficiency Heat Pump and Zone 3 Insulation:

On a prospective basis, the Mobile Home New Construction Program was found to be cost effective based on the TRC, UC and Participant tests. However, the RIM test results which are highly significant in today's environment, are negative.

B/C Ratio	Economic Test
4.14	Total Resource Test
0.78	Rate Impact Measure
6.60	Utility Cost
2.37	Participant

Assumptions:

I. Program Costs (2003 $)

The cost/benefit analysis was performed using projected program costs based on the actual program costs realized in the second phase of the program but adjusted to exclude any one-time costs such as load research meters and contracted electrician costs. Based on the first two years of the three year extension (2003 –2004) with a total of 250 participants, the total Mobile Home New Construction Program costs were $140,124. This includes promotional/administrative, customer and dealer incentives, evaluation, and other miscellaneous costs. A breakdown of actual program costs for 2003-2004 are outlined in Table 5.

The costs for 2003 – 2004 are as follows:

Table 5: Actual Program Costs

	2003 - 2004
Evaluation	$ 1,514
Equipment/Vendor	$ 12,400
Customer Incentives	$ 124,250
Other	$ 1,960
Total Program Cost	**$ 140,124**

The anticipated program costs on per participant basis are shown in Table 6.

Table 6: Anticipated Costs

Costs Used in Cost/Benefit Analysis	Per Participant
Promotional Costs (Dealer Incentive)	$ 50
Customer Incentive	$ 500
Evaluation Cost	$ 20
Total	**$ 570**

Additional measure/program characteristics based on the three-years of the program and assumed for the cost/benefit analysis are:

A. Life of a high efficiency heat pump assumed at 15-years, with no replacement

B. 17% Freeriders

C. Incentive Payments : $500 to the participant and $50 to the dealer

D. Average Incremental cost to the participant $ 1,012

E. Evaluation costs set at $20 per participant

F. Includes T&D loss savings of 10% for energy and 11% for demand

The assumed load impacts are described in Appendix E.

High Efficiency Air Conditioning Measure:

On a prospective basis, adding an incentive for high efficiency central AC in the Mobile Home New Construction Program was found to be cost effective based on the TRC, RIM, UC and Participant tests.

B/C Ratio	Economic Test
5.15	Total Resource Test
1.60	Rate Impact Measure
5.35	Utility Cost
1.69	Participant

Assumptions:

I. Program Costs (2003 $)

The total incremental cost to the participant of a high efficiency central AC (12 SEER) in place of standard efficiency central AC (10 SEER) is estimated to be $175 based on a survey of HVAC dealers. During the program duration between 2003-2004, there were a total of 2 participants for this measure. The anticipated program costs on per participant basis are shown in Table 7.

Table 7: Anticipated Costs

Costs Used in Cost/Benefit Analysis	Per Participant
Promotional Costs (Dealer Incentive)	$ 25
Customer Incentive	$ 125
Evaluation Cost	$ 20
Total	**$ 170**

Additional measure/program characteristics based on the three-years of the program and assumed for the cost/benefit analysis are:

A. Life of a Central AC assumed at 15-years, with no replacement

B. 25% Freeriders

C. Incentive Payments : $125 to the participant and $25 to the dealer

D. Average Incremental cost to the participant $175

E. Evaluation costs set at $20 per participant

F. Includes T&D loss savings of 10% for energy and 11% for demand

The assumed load impacts are described in Appendix D.

Exhibit 1: Participating Mobile Home Dealerships

Exhibit 1

Participating Mobile Home Dealerships

Mobile Home New Construction Program – Manufactured Housing Dealers

Grayson Mobile Homes
P.O. Box 8
Grayson, KY 41144

The Home Show
RR7 Box 23580
Lousia, KY 41230

Lakeside Homes
42 Jerrs Dr.
Jackson, KY 41339

White Hall Mobile Homes, Inc.
P.O. Box 274
Banner, KY 41603

The Home Show
P.O. Box 897
Belfry, KY 41514

Glenn's Finer Homes
615 Kentucky Ave.
Norton, VA 24273

Watt's Mobile Homes
917 Morton Blvd.
Hazard, KY 41702

Jerry Adkins Mobile Homes
2741 US 23 South
Pikeville, KY 41501

Clayton Homes
State Route 1947
Grayson, KY 41143

White Hall Mobile Homes
171 Citizens Lane
Hazard, KY 41701

The Home Show
13135 St. Rt. 180
Ashland, KY 41102

Dream Homes
580 C. W. Stevens Blvd.
Grayson, KY 41144

Oakwood Homes
530 HWY 1947
Grayson, KY 41144

Fleetwood Homes
P.O. Box 1327
Louisa, KY 41230

Rainbow Homes
HWY 321
Paintsville, KY 41240

LUV Homes
8499 US 23
Ivel, KY 41642

Hylton Homes
P.O. Box 170
Ivel, KY 41642

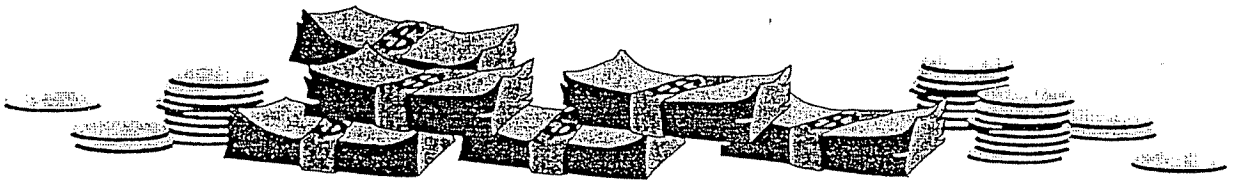
Edgewood Mobile Homes
P.O. Box 360
Hazard, KY 41701

Best Buy Homes
2939 North Mayo Trail
Pikeville, KY 41502

Glenn's Finer Homes
P.O. Box 307
Pound, VA 24279

Exhibit 2: Program Brochure

Purchase a New Mobile Home . . . . equipped with an Electric Heat Pump Receive $500* . . . from American Electric Power



You can receive a $500 Rebate from AEP when you order a New Mobile Home with an High Efficiency Heat Pump and an upgraded Insulation Package

OR

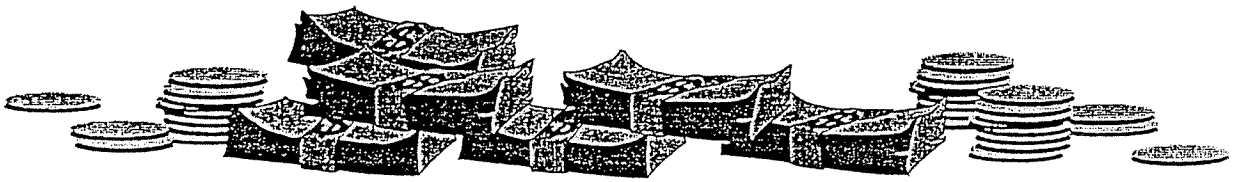
Purchase a mobile home with an upgrade Insulation Package and have the dealer install a High Efficiency Heat Pump

The Electric Heat Pump provided Heating & Cooling in one system, while saving up to 46% over an electric furnace **

To Qualify Efficiency Rating Must be:
Split System 11.0 SEER or 7.2 HSPF
Package System 10.0 SEER and 6.8 HSPF

* For Residential Services Only

** Savings based on Study conducted over 1 year, comparing various heating systems and insulation packages. Study conducted by AEP is on file with the Public Serice Commission and copies of study are available upon request.



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Appendix A: AEP 2000 Residential Customer Survey Results

Kentucky Mobile Home New Construction Market Characteristics

Appendix A

Kentucky Power Company
Kentucky Mobile Home New Construction Market Characteristics
Based on AEP 2000 Residential Customer Survey

Market Size & Penetration of Electric Heat Pump

Market Size

Percent of Mobile Home	
<= 2-Years Old	7.5% (2,980 Customers)

Penetration of Heat Pump in Mobile Home New Construction Market

Electric Heat Pump	28.7%
Electric Central Furnace & Central AC	47.3 %
Electric Central Furnace & Window AC	0 %
Electric Central Furnace & No AC	0 %
Non-Electric Central Furnace & Central AC	10.5 %
Other	13.5 %

Appendix A

Kentucky Power Company
Kentucky Mobile Home New Construction Market Characteristics
Based on AEP 2000 Residential Customer Survey

Market Characteristics:

Location of Home	
City or Urban	4.7%
Suburban	17.2%
Town or Village	4.6%
Rural Non-Farm	66.8%
Farm	6.6%

Size of Home	
Under 1200 sq. ft.	30.8%
1201 - 2000 sq. ft.	37.4%
2001 - 3000 sq. ft.	20.8%
Over 3000 sq. ft.	0.0%
Do Not Know	11.0%

Education Level	
<= Grade School	27.4%
Some High School	17.2%
Completed High School	22.1%
Some College or Technical College	20.0%
Completed College	13.4%

Appendix A

Kentucky Power Company
Kentucky Mobile Home New Construction Market Characteristics
Based on AEP 2000 Residential Customer Survey

Market Characteristics

Income Level

Under $20,000	41.8%	
$20,001 - $30,000		6.4%
$30,001 - $40,000		16.4%
$40,001 - $50,000		0%
$50,001 - $60,000		19.0%
$60,001 - $70,000		16.4%
$70,001 - $80,000		0 %
Over $80,000		0%

Natural Gas Available

Yes		29.2%
No		45.7%
Do Not Know	25.1%	

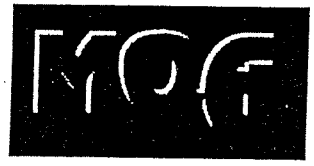
Appendix B: Customer Follow-Up Survey Questionnaire And Results

Kentucky Power

Mobile Home New Construction Customer Survey

June 2002

Conducted by:

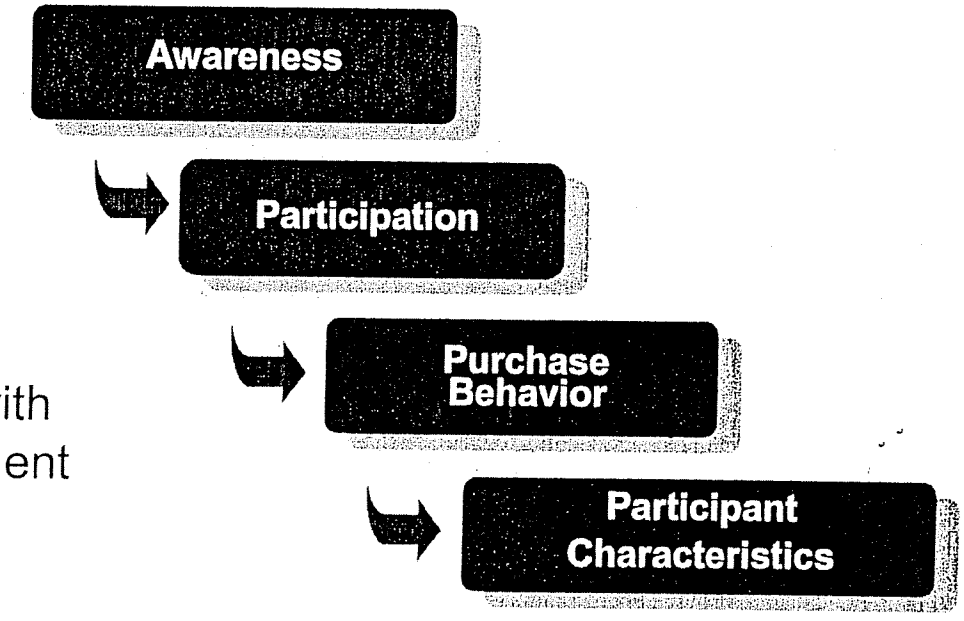


Contents

Introduction

Research Objectives

- To gauge program awareness.
- To understand reasons for participation in the mobile home new construction program.
- To measure customer satisfaction with equipment performance, the equipment installer, and the rebate level.
- To measure Freerider effects.



Introduction

Methodology

- Telephone interviews were conducted with 50 participants in the Mobile Home New Construction Program.
- Respondents were randomly recruited for participation in the study.
- The questionnaire was pre-tested for accuracy on May 22, 2002.
- Interviews were conducted May 28 through June 3, 2002.
- Interviews were conducted by MQA Research, Inc.

Introduction

Representative Nature of Results

- Respondents were randomly recruited for participation of the study. Interviews were attempted on various days and at a variety of times in order to reach respondents at convenient times and maximize use of the sample.

- Based on information provided by Kentucky Power, survey respondents are representative of the overall population. A comparison of respondent characteristics to the population is outlined below:

AREA	Population	Sample
11	56%	58%
12	19%	10%
13	5%	8%
14	1%	4%
15	8%	12%
16	10%	6%

TAR	Population	Sample
15	31%	24%
22	69%	74%

N.B. Percentages in tables do not sum to 100% as some participants were not identified by AREA or TAR.

Awareness and Participation

Key Findings

Awareness

- Nearly three of every five participants (56%) in the new construction program indicated that they first became aware of the program through a mobile home salesman.

- Approximately one in four participants (26%) learned about the new construction program through a friend or word of mouth.

- The remaining participants learned about the new construction program through ads (4%) and one participant (2%) reported being aware because of owning a heat pump in a previous home.

- One in ten participants (12%) had no recollection of when they first became aware of the program.

Key Findings

Participation

- Multiple answers were accepted by participants as to the reason for participating in the new construction program. Among the reasons frequently mentioned were items relating to cost. This includes one in three participants (34%) who chose the new construction program to save money, and nearly two of every ten participants (16%) who chose the program to receive a rebate. Additionally, just over one in ten participants (14%) reported that they participated in the program because it was a good deal.

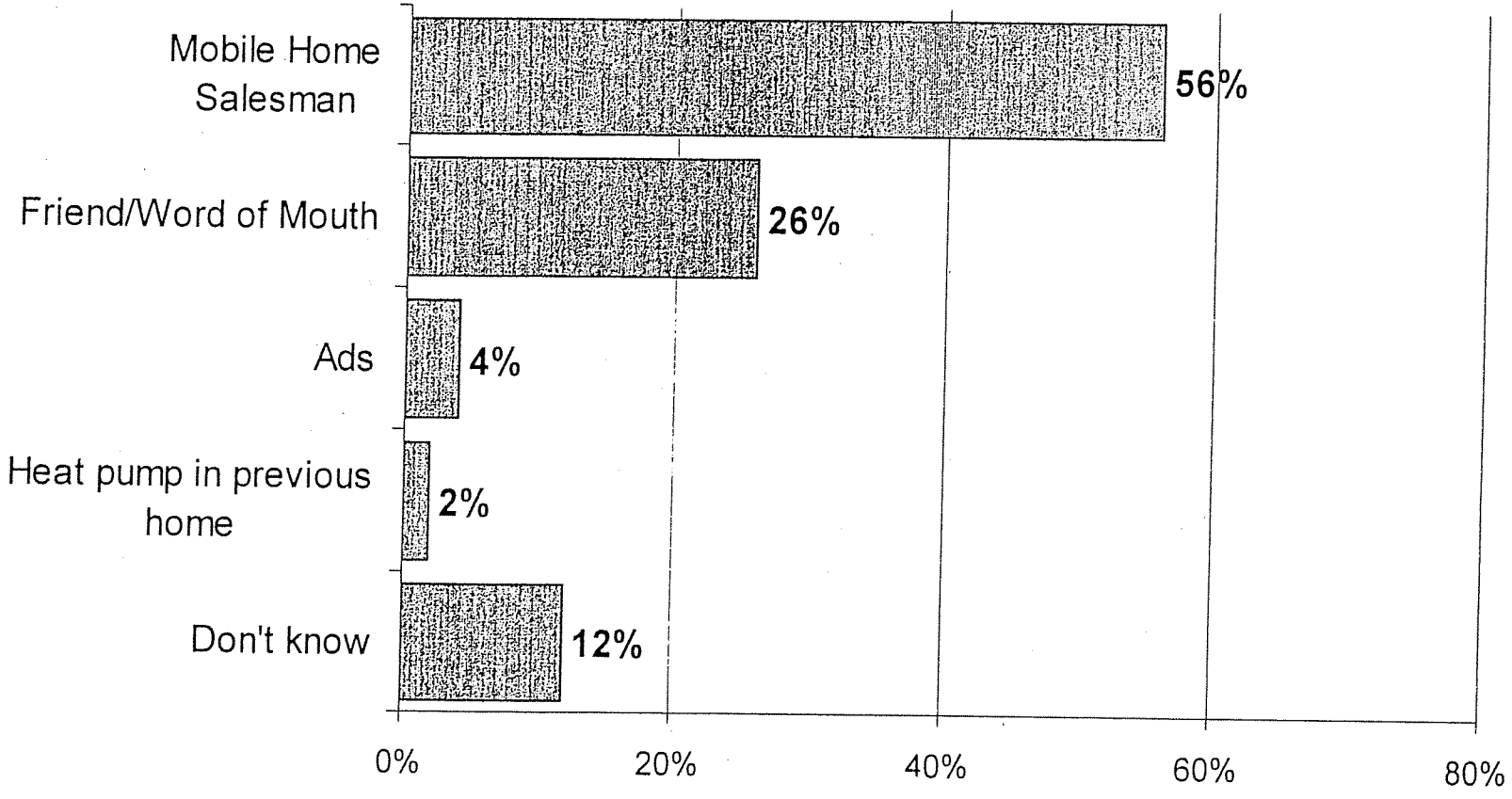
- Approximately one out of four participants (24%) believe in saving energy and reported participating in the program for this reason.

- Nearly one of every five participants (18%) indicated they participated because the rebate program came with their construction package.

- One participant (2%) participated in the new construction program simply for the comfort of owning a heat pump, based upon prior experience.

How Became Aware Of New Construction Program

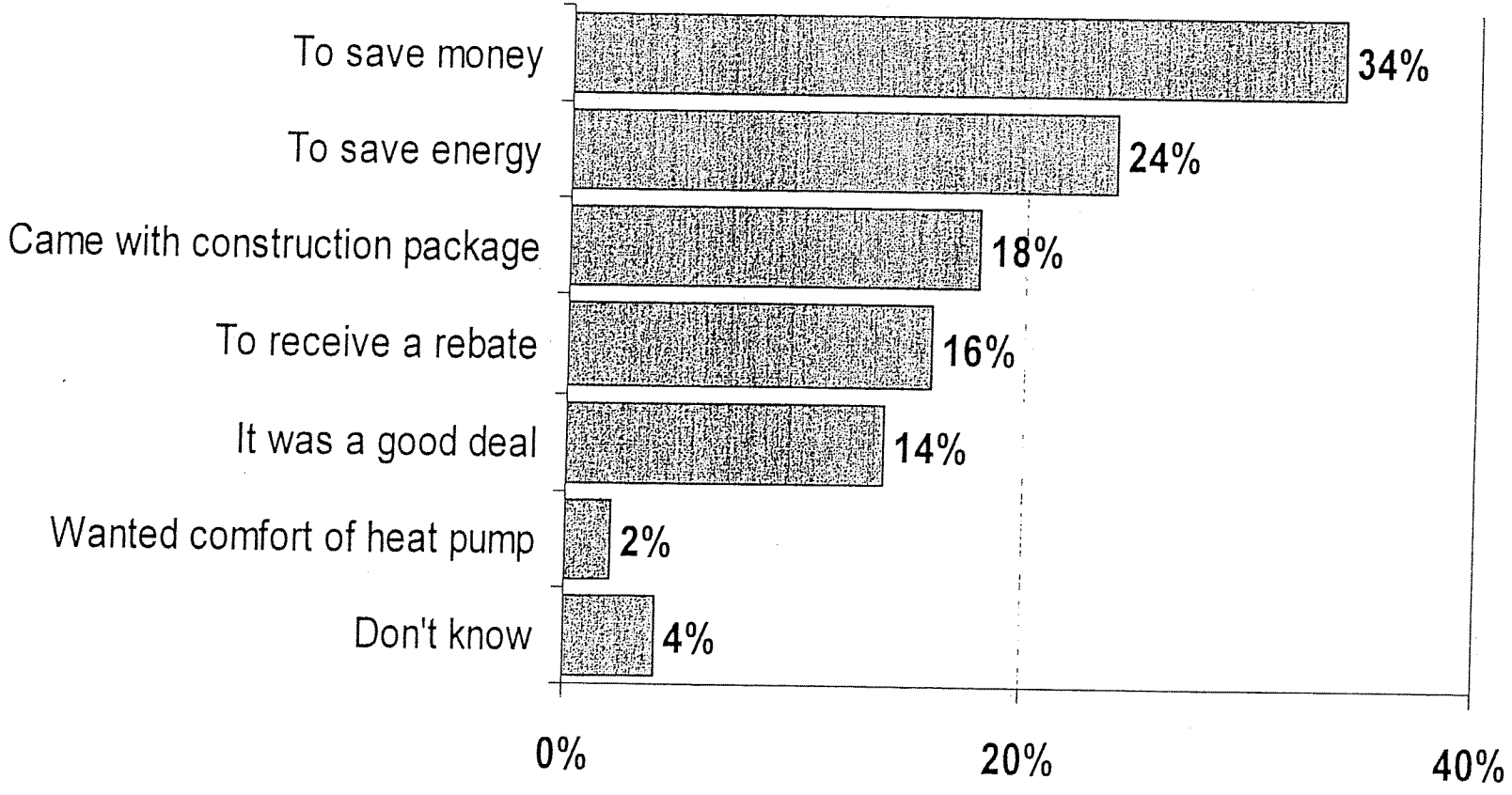
(Q1. How did you first become aware of the mobile home new construction program?)



(n = 50)

Main Reason For Participation In New Construction Program

(Q2. What was the main reason why you participated in the mobile home new construction program?)



(Note: Multiple responses allowed)

(n = 50)

Purchase Information

Key Findings

Dealer Comparison

- Two of every ten participants (22%) reported that the sales representative who sold them their mobile home offered a comparison between the high efficiency heat pump and a standard efficiency heat pump or other unit. Nearly seven of ten participants (66%), however, reported that no comparison was made – the sales representative only discussed the high efficiency heat pump.

Personal Comparison

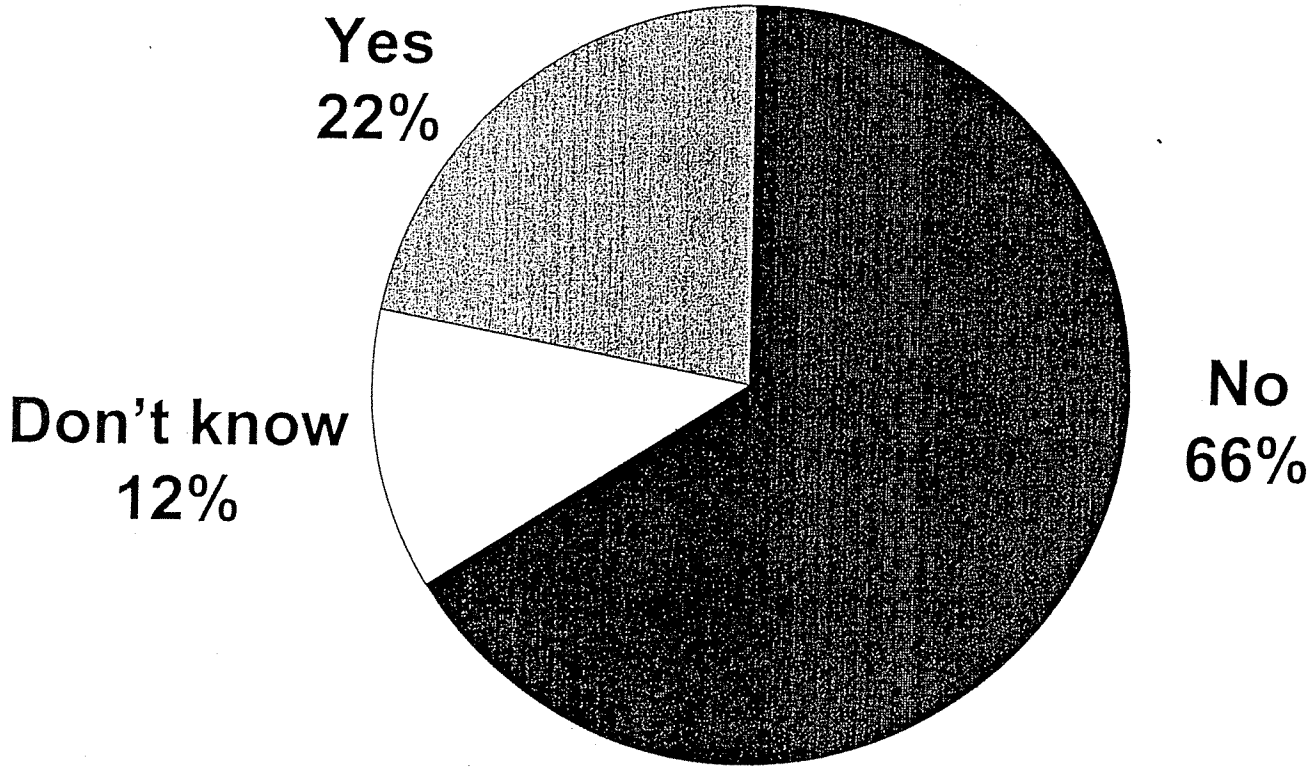
- Nearly seven of every ten participants who reported that the sales representative did not offer any comparison suggested that they collected information on their own that allowed for a comparison between the high efficiency heat pump and another unit.

Dealer Influence

- All of the participants (10 in total) who reported that the sales representative did not offer a comparison and they did not seek a comparison on their own also reported that they purchased a high efficiency heat pump solely because it was included in the mobile home package that they purchased.

Dealer Comparison – Heat Pump

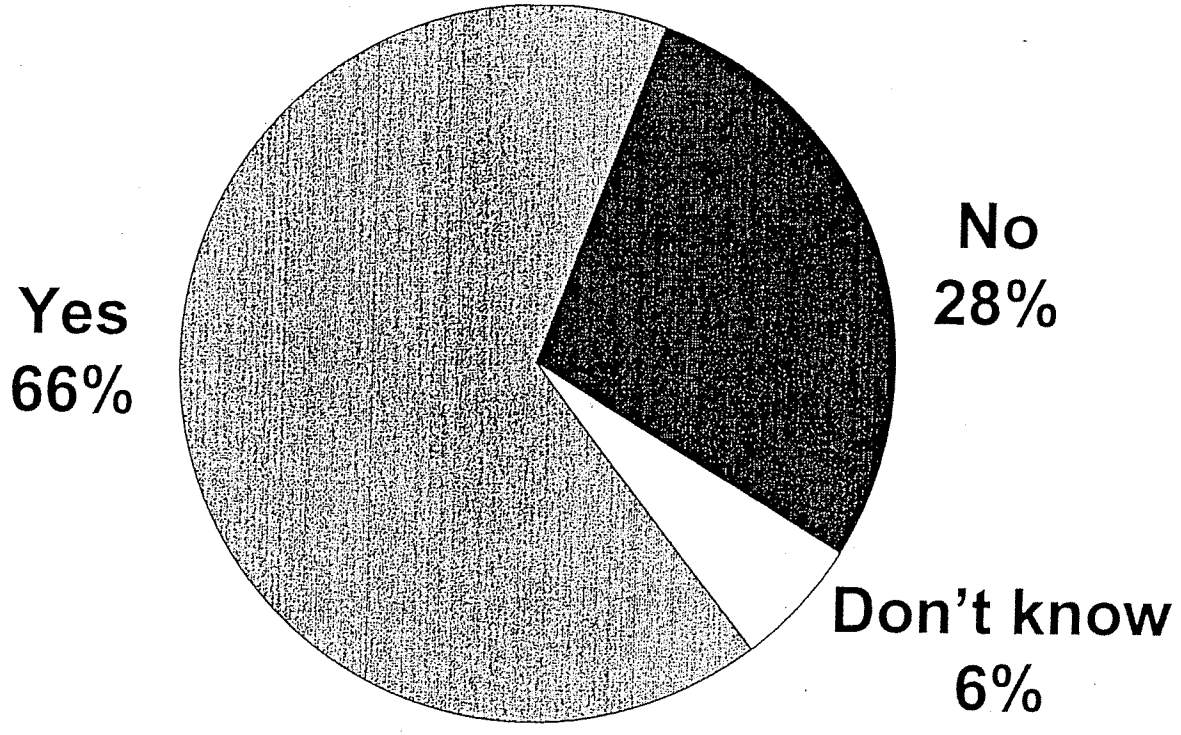
(Q4. Did the sales representative who sold you your heat pump explain to you the difference between purchasing a high efficiency heat pump versus purchasing a standard efficiency heat pump or another heating and cooling unit?)



(n = 41)

Personal Comparison – Heat Pump

(Q5. Did you already know about the heat pump or did you find information about the cost and operational differences between a high efficiency heat pump and a standard efficiency heat pump or other unit?)



(Question asked of participants who did not receive a comparison from the sales rep) (n = 32)

Key Findings

Dealer Comparison

- Three of every ten participants (32%) reported that the sales representative who sold them their mobile home explained the need to upgrade to Zone 3 insulation because they were installing a high efficiency heat pump. Nearly six of ten participants (56%), however, reported that the sales representative did not discuss Zone 3 insulation.

Personal Comparison

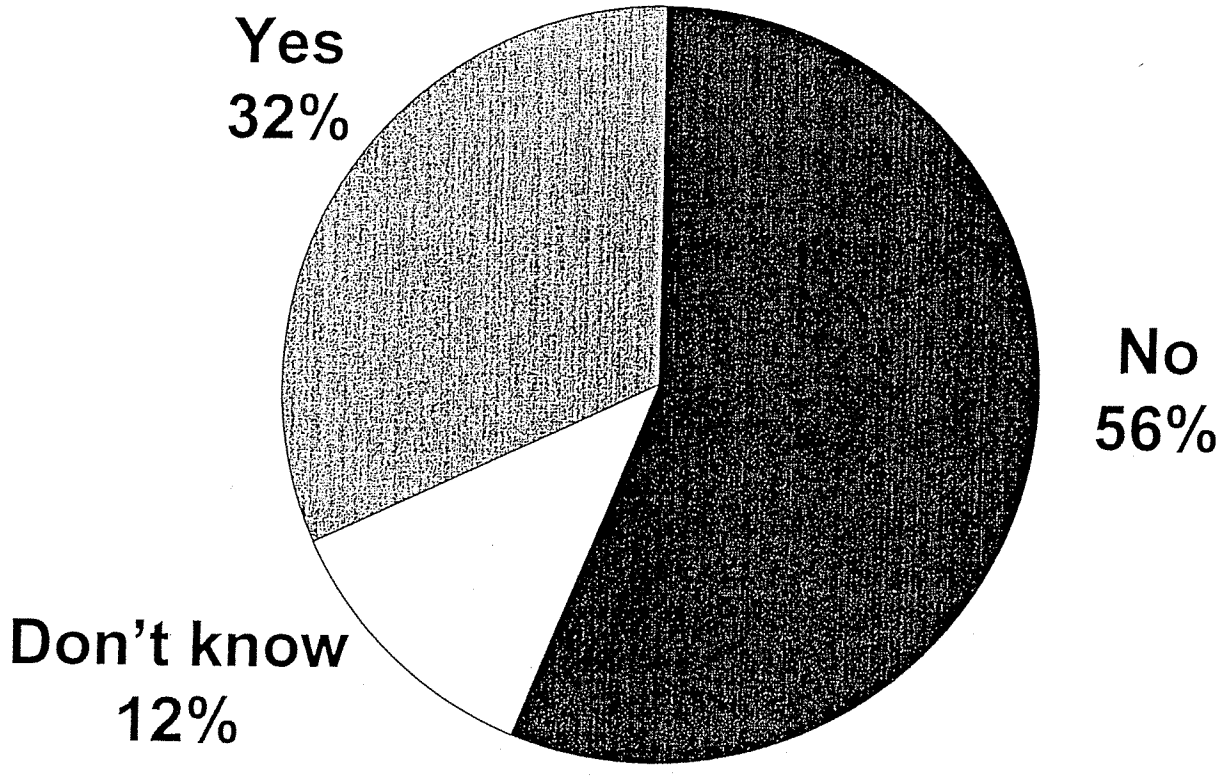
- Approximately two of every ten participants (18%) who reported that the sales representative did not discuss Zone 3 insulation suggested that they were already aware of the need to upgrade to Zone 3 insulation. Approximately eight in ten (78%), however, knew nothing about Zone 3 insulation.

Dealer Influence

- All of the participants (23 in total) who reported that the sales representative did not discuss Zone 3 insulation and they had no knowledge of the need to upgrade also reported that they upgraded their insulation solely because it was included in the mobile home package that they purchased.

Dealer Comparison – Insulation

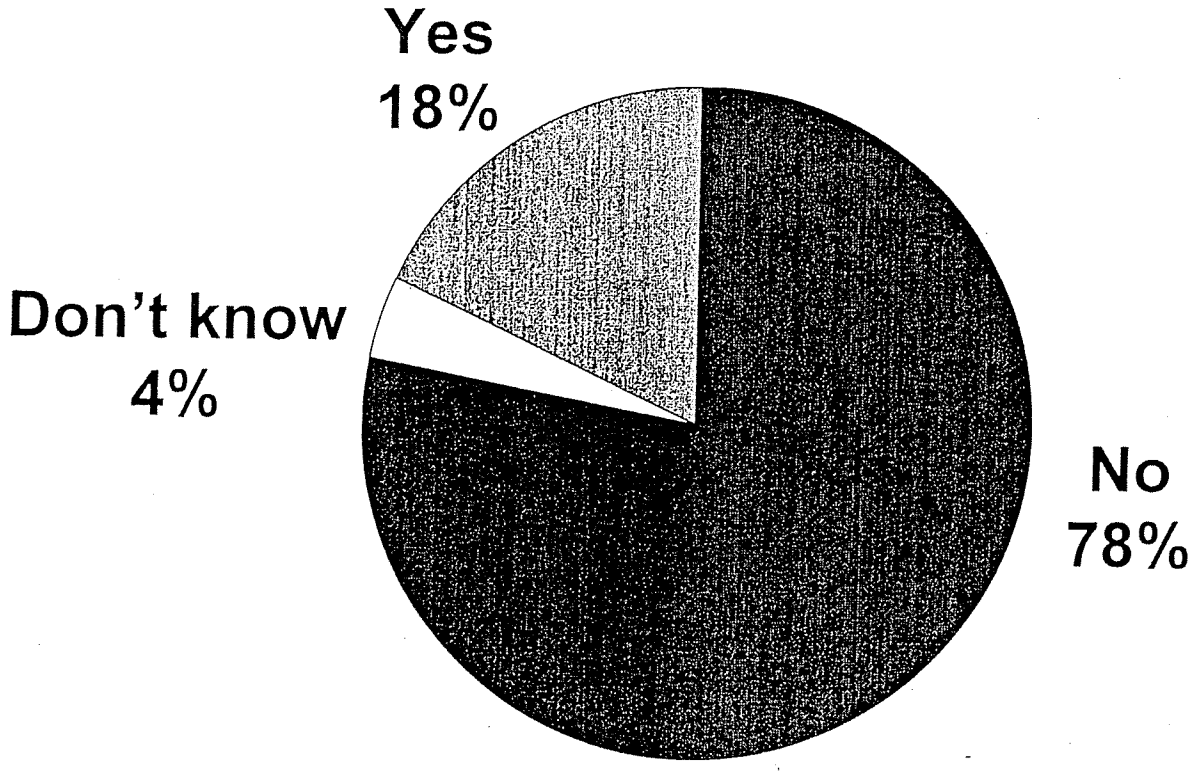
(Q8. Did the sales rep who sold you your heat pump explain to you the need to upgrade your insulation because you were installing a high efficiency heat pump, or did the sales rep not say anything about the need to upgrade your insulation?)



(n = 41)

Personal Comparison – Insulation

(Q9. Did you already know about the need to upgrade your insulation, or were you not aware that you would need to upgrade the insulation in your new home?)



(Question asked of participants who did not receive a comparison from the sales rep) (n = 28)

Purchase Behavior

Key Findings

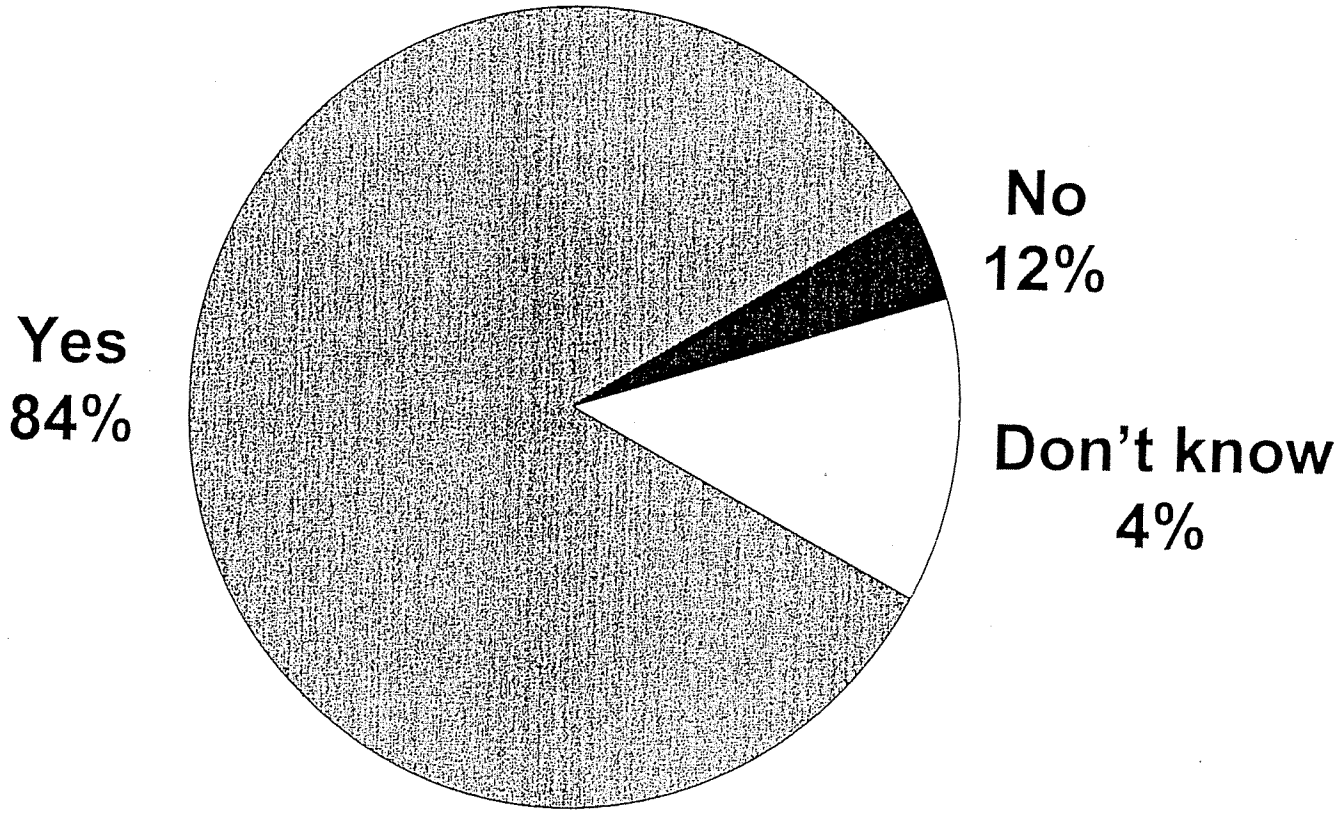
Purchase Plans

- Just over eight in ten participants (84%) in the mobile home new construction program suggested that they planned on purchasing a heat pump even prior to participating in the program. Approximately one participant in every ten (12%) had not planned on a heat pump prior to participating in the program.

- One-half of participants (52%) reported that they planned on purchasing Zone 3 insulation for their new home prior to participating in the new construction program. Nearly two out of every five (38%) had not planned on purchasing insulation prior to participating in the program.

Planned On Purchasing High Efficiency Heat Pump In New Home

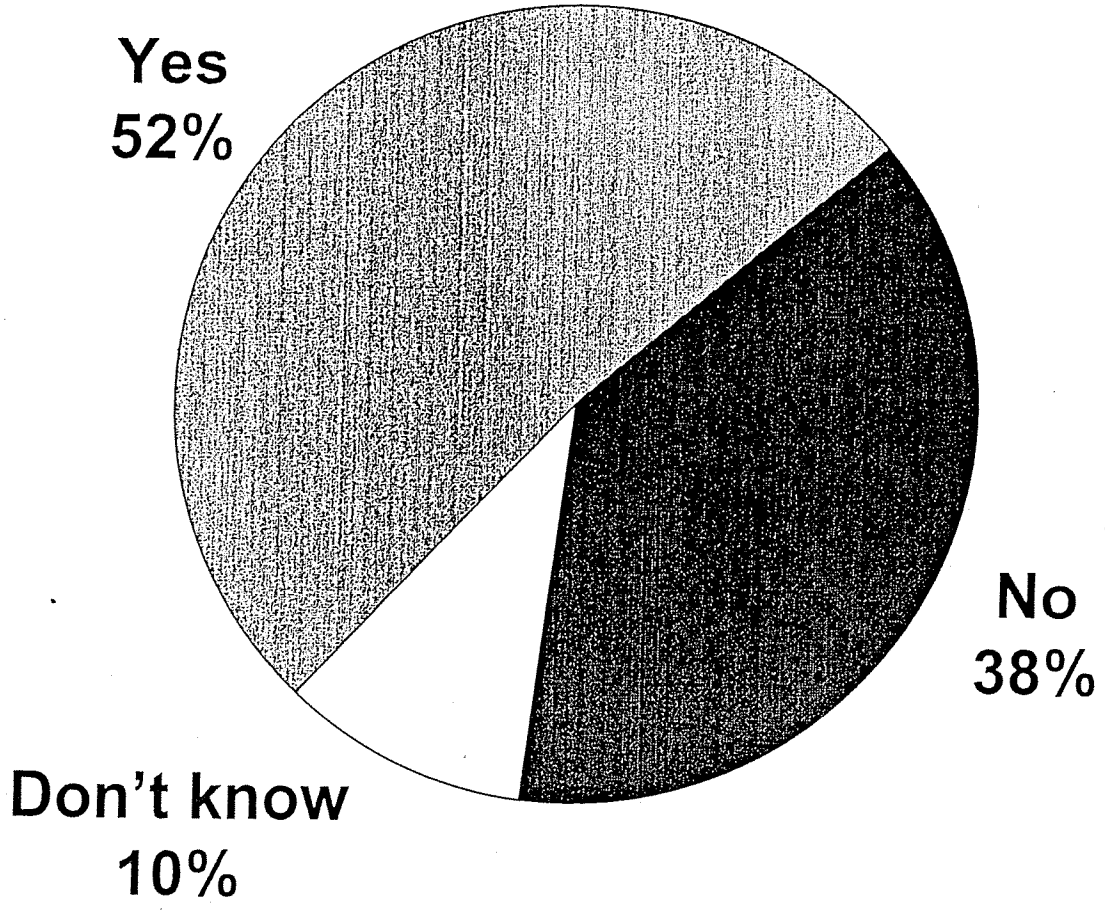
(Q3. Prior to participating in the mobile home new construction program, had you planned on purchasing a high efficiency heat pump in your new home?)



(n = 50)

Planned On Purchasing Insulation For New Home

(Q7. Prior to participating in the mobile home new construction program, had you planned on purchasing upgraded insulation for your new home?)



(n = 50)

Key Findings

Purchase Intent – Heat Pump

- Nearly seven out of ten participants (66%) in the mobile home new construction program reported that they were likely to purchase a high efficiency heat pump even if there was no rebate, including just over one in three (37%) who reported being very likely.

- One in ten participants (10%) reported that they were not likely to purchase the high efficiency heat pump without the rebate. Moreover, one in four (24%) were not likely in that they reported being neither likely nor not likely since the high efficiency heat pump was included with the overall package that they purchased for a mobile home new construction.

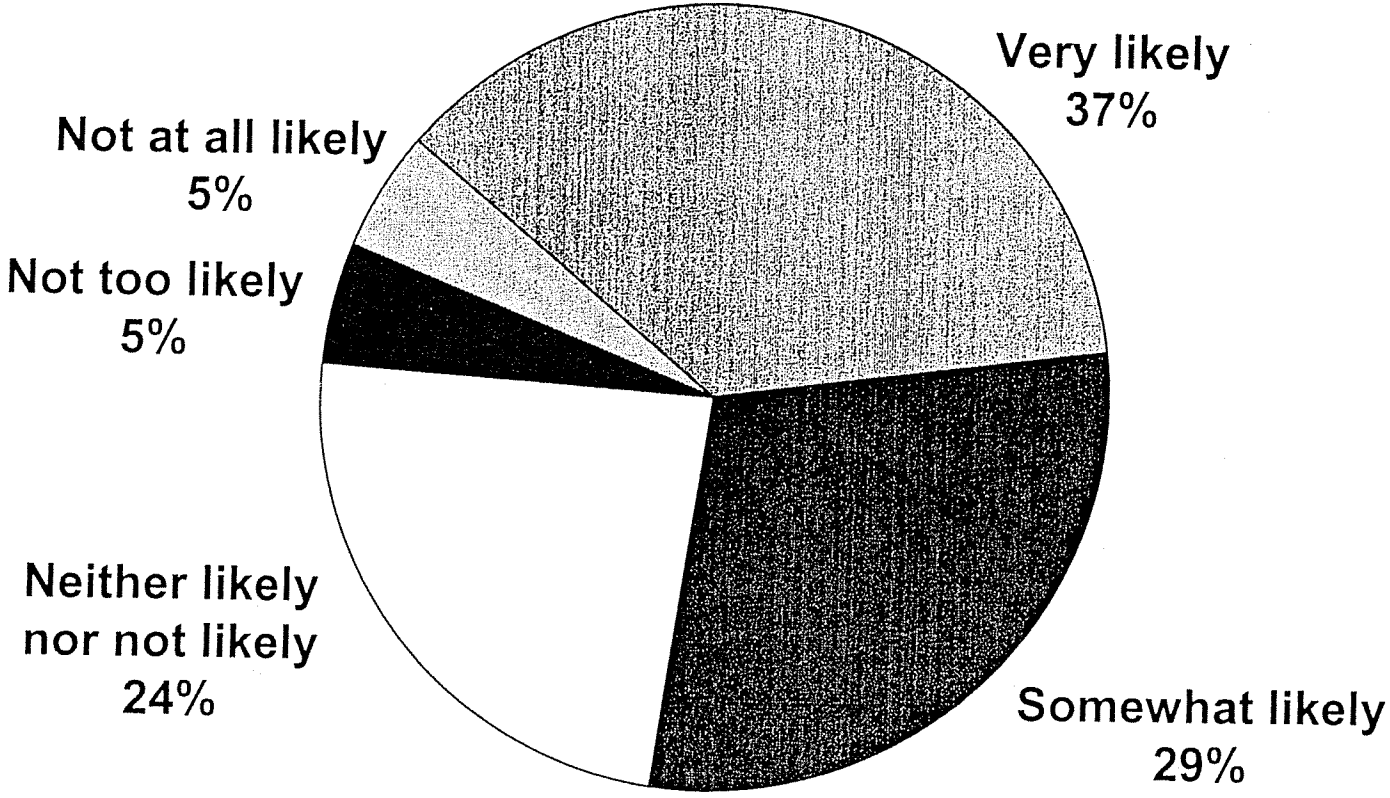
Purchase Intent – Zone 3 Insulation

- Just over four of ten participants (44%) reported that they were likely to upgrade their insulation even if there was no rebate.

- Few participants (4%) reported that they were not likely to upgrade their insulation without the rebate. Moreover, one-half (52%) of participants were neither likely nor not likely to upgrade their insulation. This is because one-half of participants either did not know that they needed upgraded insulation or they simply accepted the insulation that was included in the mobile home package which they selected.

Likelihood Of Installing High Efficiency Heat Pump If There Wasn't A Rebate

(Q17. How likely were you to install a high efficiency heat pump if there was not a rebate?)



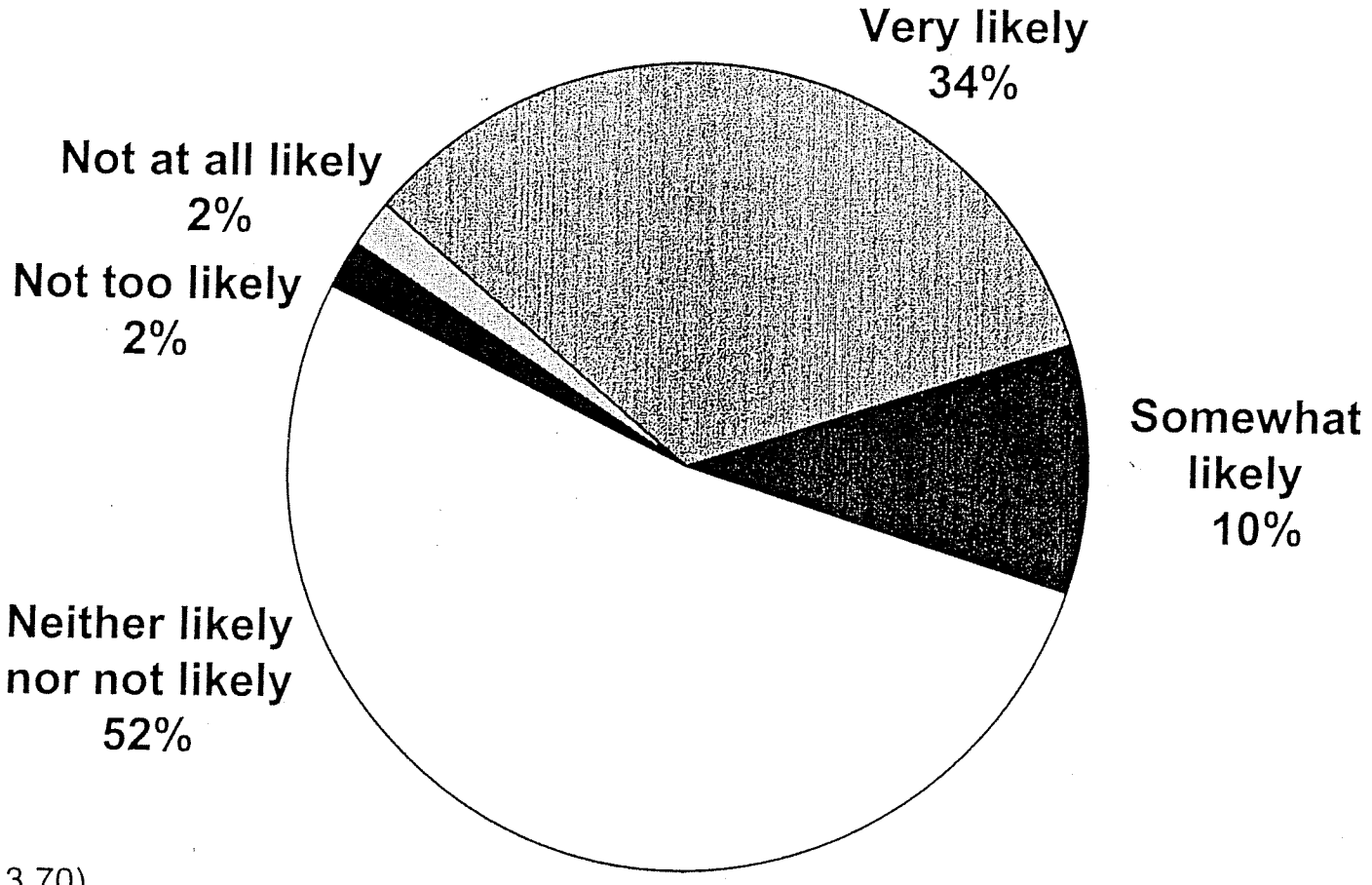
(Mean = 3.88)

(Mean based on a 5 point scale where 5 = Very likely and 1 = Not at all likely)

(n = 41)

Likelihood Of Purchasing Upgraded Insulation Package If There Wasn't A Rebate

(Q18. How likely were you to purchase the upgraded insulation if there was not a rebate?)



(Mean = 3.70)

(Mean based on a 5 point scale where 5 = Very likely and 1 = Not at all likely)

(n = 41)

Satisfaction

Key Findings

Installation

- Nine out of ten participants (90%) in the mobile home new construction program expressed satisfaction with the service that they were provided by their installer, including approximately three of every four participants (74%) who reported being very satisfied with the service.

- Nearly two in ten participants (16%) reported being somewhat satisfied, while only a small number (4%) reported being neither satisfied nor dissatisfied.

- The one participant who expressed dissatisfaction with the service provided by the installer indicated that the reason for dissatisfaction is that the installer was from out of town and acted in a peculiar manner.

Performance

- Nearly all participants reported being satisfied with the performance of their heat pump. Overall, approximately six of every seven participants (86%) in the heat pump program reported being very satisfied with the performance of their new heat pump and approximately one in ten participants (12%) reported being somewhat satisfied. Only one respondent reported being neither satisfied nor dissatisfied.

Key Findings

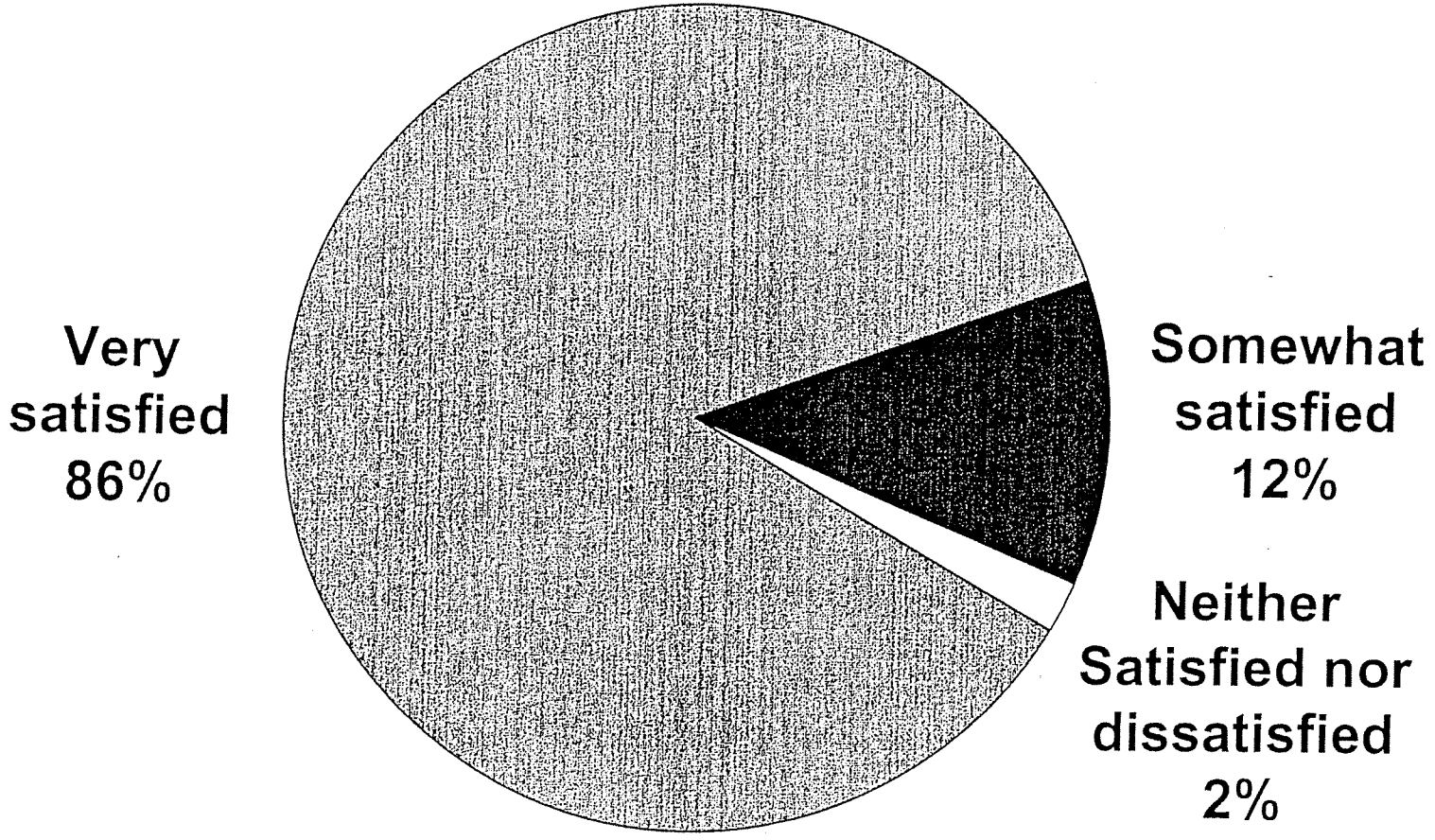
Rebate Satisfaction

- Nine out of ten of the mobile home new construction participants reported that they are satisfied with the level of rebate which they were afforded, including seven in ten participants (70%) who reported being very satisfied with their rebate.

- While no participant reported dissatisfaction, one participant (2%) reported no satisfaction or dissatisfaction regarding the amount.

Satisfaction With Heat Pump Performance

(Q11. How satisfied are you with the performance of the high efficiency heat pump?)

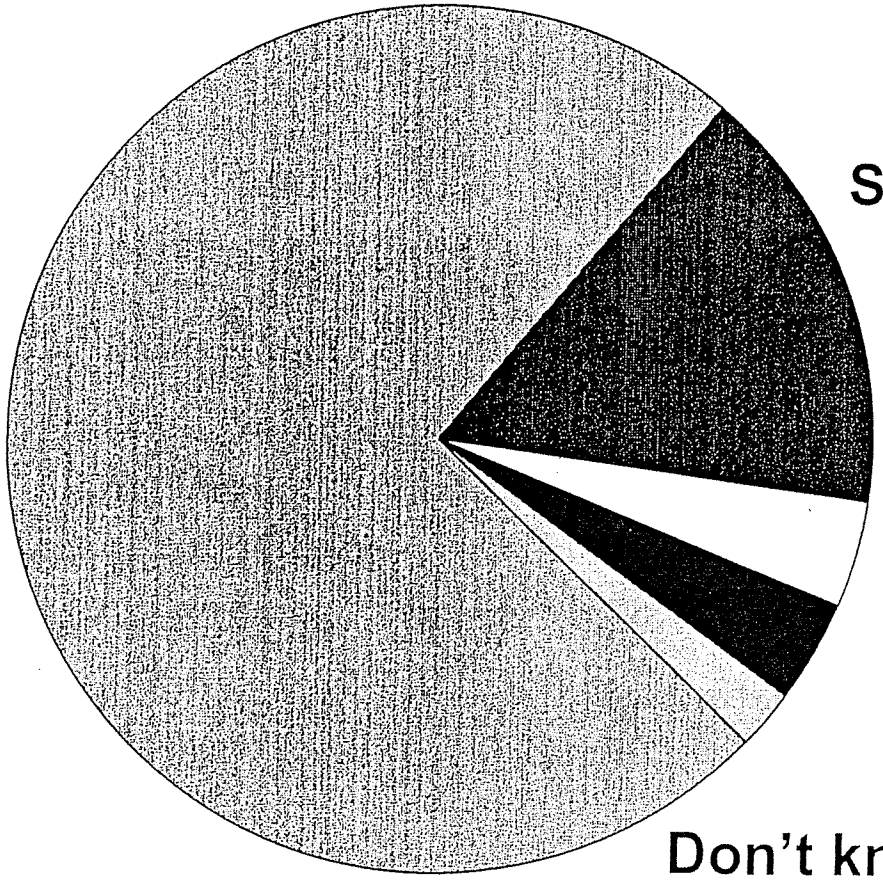


(Mean = 4.84)

(Mean based on a 5 point scale where 5 = Very satisfied and 1 = Not at all satisfied) (n = 50)

Satisfaction With Service Provided By Installer

(Q13. How satisfied are you with the service provided by the installer?)



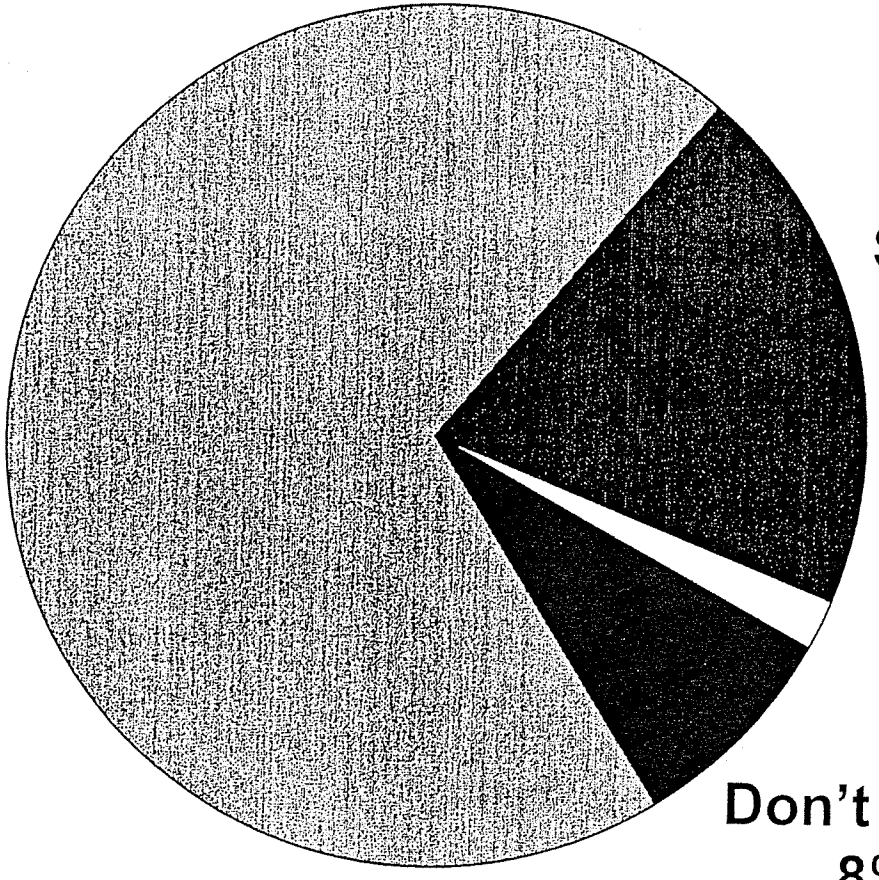
(Mean = 4.63)

(Mean based on a 5 point scale where 5 = Very satisfied and 1 = Not at all satisfied)

(n = 50)

Satisfaction With Rebate Level

(Q19. How satisfied are you with the rebate level that you were provided?)



(Mean = 4.74)

(Mean based on a 5 point scale where 5 = Very satisfied and 1 = Not at all satisfied)

(n = 50)

Heating and Cooling Settings

Key Findings

Heat Pump Heat Setting

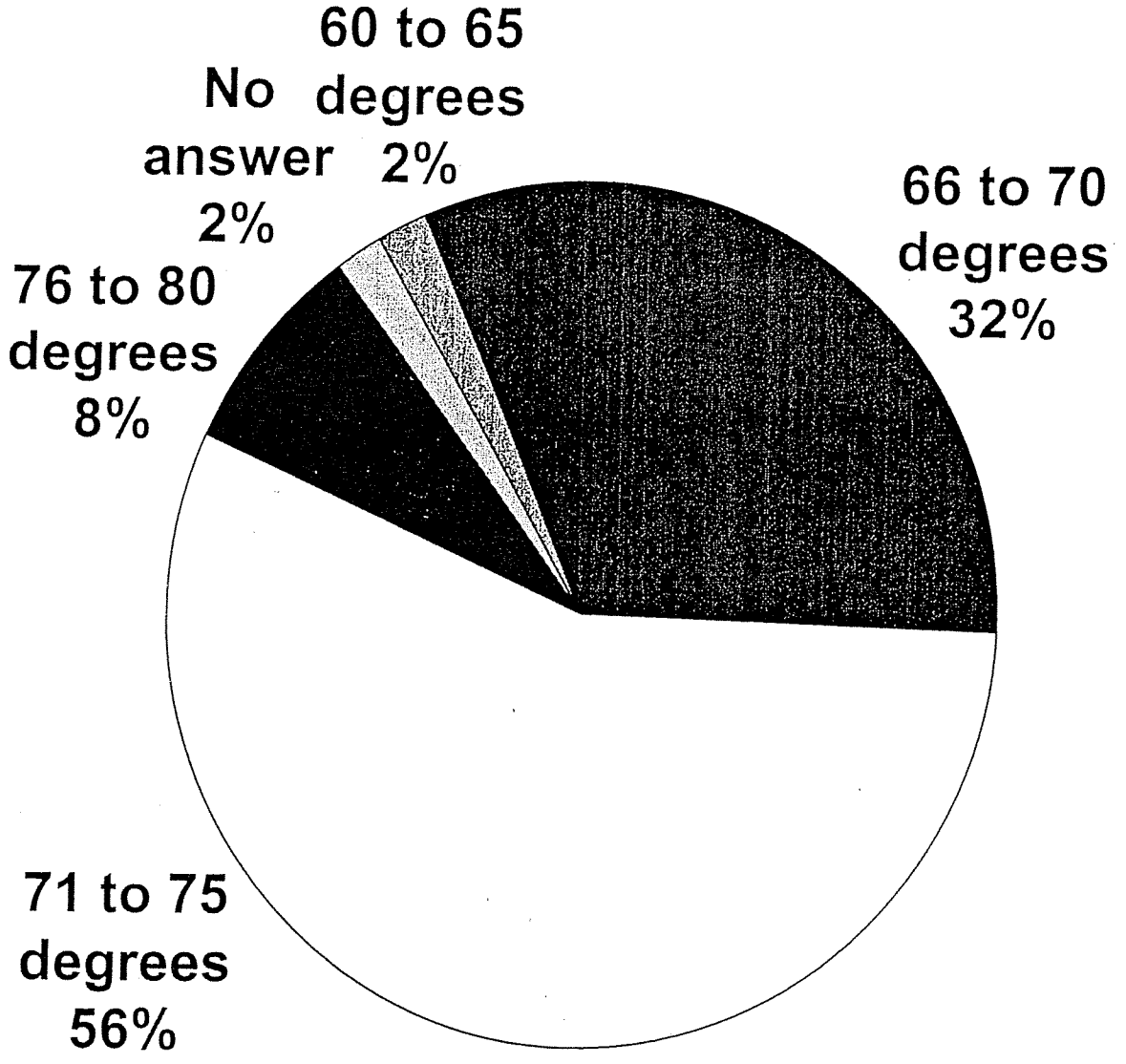
- Just over one-half of program participants (56%) reported that the heating temperature setting for their heat pump is between 71 degrees and 75 degrees. Nearly one in three (34%) reported that they keep their heat pump set at a heating temperature of 70 degrees or lower, nearly one in ten (8%) have their heat pump set at more than 75 degrees.

Heat Pump Cooling Setting

- One-half of program participants (50%) reported that the cooling temperature setting for their heat pump is between 71 degrees and 75 degrees. Two in five (40%) keep their heat pump set at a cooling temperature that is between 66 degrees and 70 degrees, while only a small number (6%) have their heat pump set to cool at 76 degrees or higher.

Heating Temperature – New Heat Pump

(Q15. What is the heating temperature setting for your new heat pump?)

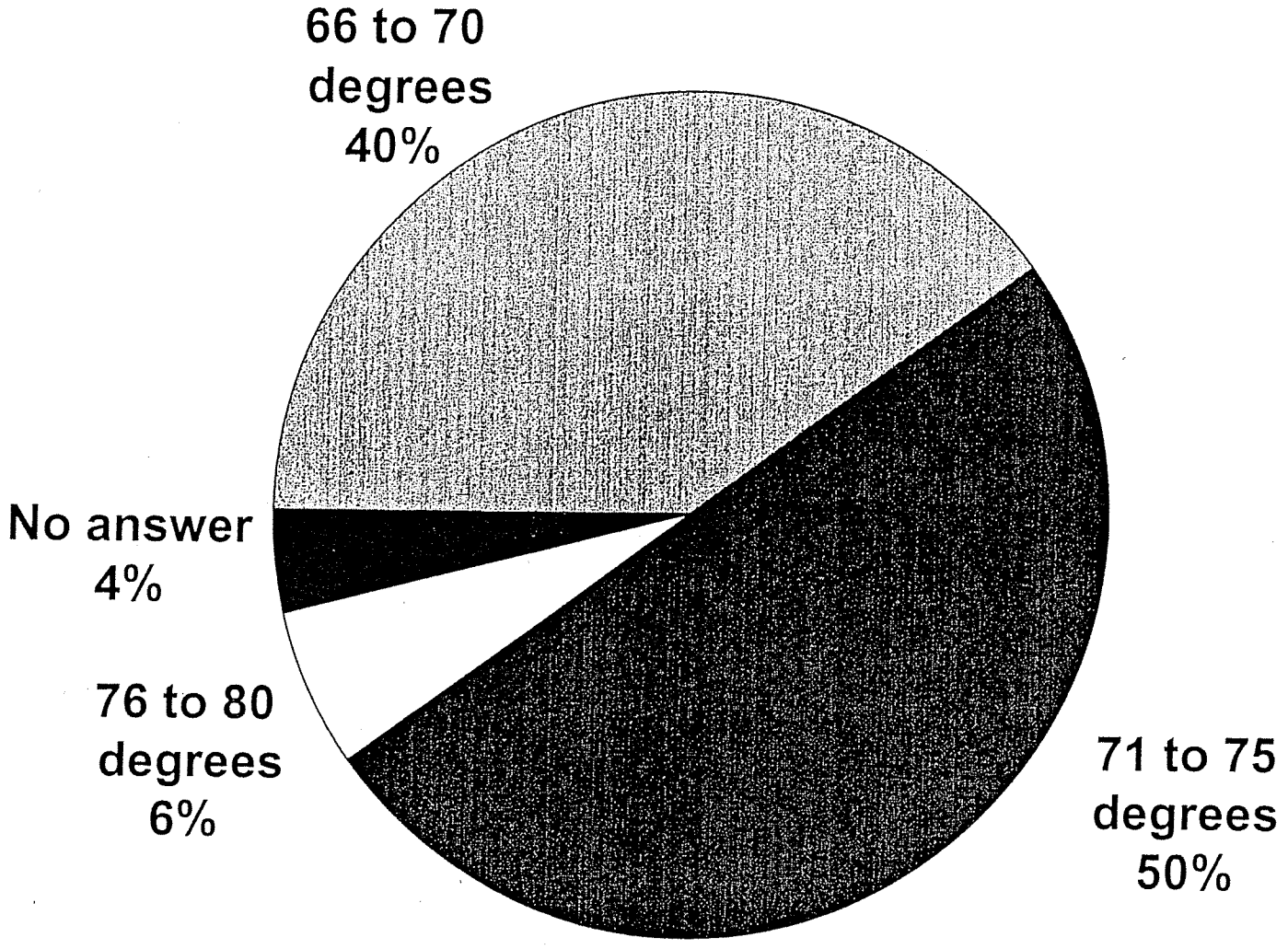


(Average temperature setting = 71.6 degrees)

(n = 50)

Cooling Temperature – New Heat Pump

(Q16. What is the cooling temperature setting for your new heat pump?)



(Average temperature setting = 71.2 degrees)

(n = 50)

Issues of Note

Issues of Note

Observations

- Sales representatives and word of mouth are the key ways in which knowledge about the Mobile Home New Construction Program is spread. Sales representatives play the major role in promoting the program, but participants who discuss their experiences are strong links to communicating the program.

- There are no obvious issues or concerns with the contractors, quality of installation, or performance of heat pump.

- The rebate level is not a concern to program participants.

- Anecdotal information provided by participants suggest that knowledge about costs of installation are lacking. Many participants reported that they simply selected a mobile home model and were told a net cost; costs for key features of the home were not itemized.

Issues of Note

Freeriders

- Relatively few participants in the new construction heat pump program are classified as freeriders. While just over eight in ten participants reported that they planned on purchasing a heat pump for their new home, and nearly seven in ten participants reported that they would have installed a heat pump even without a rebate, fewer participants appeared likely to upgrade their insulation without a rebate.

- For new construction, much of the purchase motivation may be explained in mobile home purchase behavior: participants select a model based on overall appeal, comfort, and affordability; the heat pump and related rebate are included in the package. Indeed, eight of ten participants reported that, in the end, they installed what came with the package they selected or simply what the mobile home sales representative suggested would be the best unit.

- While most participants did not directly report that they purchased a heat pump due to a rebate program, one in four suggested that they participated in the program to get the rebate or because the program made purchasing a heat pump a good deal.