research/into/action inc

Final Report

2009 Oregon Residential Awareness and Perception Study

Funded By:

EnergyTrust of Oregon

Submitted To:

Sarah Castor
Philipp Degens, Ph.D.
Energy Trust of Oregon

Prepared By:

research/into/action inc

Jane S. Peters, Ph.D.
Jun Suzuki
Mersiha Spahic
Research Into Action, Inc.

November 17, 2009

ACKNOWLEDGEMENTS

We would like to thank Energy Trust of Oregon for conceiving of this project and giving us needed support. Opinion Dynamics Corporation conducted the interviews, which were ably managed by Jennifer Mitchell-Jackson. Laurie Lago of Business Service Bureau edited and produced the report. We are very grateful for their efforts on this project. Finally, we wish to acknowledge the many residents of Oregon who agreed to participate in the survey.

TABLE OF CONTENTS

ES EXECUTIVE SUMMARY

This report provides the results of the *2009 Oregon Residential Energy Awareness and Perception Study*, conducted by Research Into Action, Inc. The goal of this report is to provide findings and recommendations useful to improving Energy Trust's marketing activities to help it achieve its energy-saving goals in the residential sector.

Opinion Dynamics Corporation (contacted to perform the surveys for this study) completed 904 interviews between May and July 2009. Thirty-six percent of respondents in the state at large and 41% of those within the Energy Trust territory reported unaided awareness of Energy Trust. We estimate the participation rate in Energy Trust programs at 7% statewide and at 9% in the Energy Trust-targeted territory. We observed an increase in the reported awareness of Energy Trust in most parts of Oregon, but most noticeably in the Portland Metropolitan and Willamette Valley / North Coast regions. In spite of increased recognition of Energy Trust, a substantial portion of those aware (40%) did not know much about specific program offerings.

We found that electric-heated homes in PGE and PacifiCorp territory (which scatters across the state) have the lowest rate of participation in Energy Trust programs, even though this group qualifies for rebates for both appliances and space heating equipment. This group constituted 48% of all respondents.

For those respondents who had participated in programs, satisfaction with services received from Energy Trust was high, as was their intention to participate again in Energy Trust programs (41%).

Energy Trust program participants' attitudes differed from those of nonparticipants in regard to specific behaviors that could result in energy savings and more responsible use of energy. They described upgrading appliances and windows, installing insulation, changing thermostat settings, and driving less as significantly higher priority actions. They are also more likely than nonparticipants to believe that global climate change is a result of high energy use. Renters expressed high concern about energy issues and a desire to make their homes more energy efficient; however, they perceived limited means for action.

Specific observations in regard to energy-using behaviors are noted. We estimate the CFL penetration rate at 85% (households that have at least one CFL in their home). The increase since 2008 in CFL penetration was particularly apparent among nonparticipants; we no longer observe differences in penetration between participants and nonparticipants. Forty percent of respondents reported they had programmable thermostats, but only 66% of them actually used automatic features to control indoor temperatures. Fifty-five percent of respondents said their homes had an air-conditioning system; 36% of these homes had window or room air-conditioning units. Ninety-two percent of respondents reported they used at least one power strip, with a majority of them (68%) saying they never or rarely turned off the main switch. In addition, 61% of

respondents recognized the ENERGY STAR® label; participants were significantly more aware of the label.

Respondents' self-assessment of their home's energy efficiency revealed that those who lived in older homes believed their homes were less efficient than those who lived in newer homes. Consistent with this, the analysis of the consumption data for households in the survey with billing data revealed that single-family dwellings in the Portland Metropolitan and Willamette Valley / North Coast regions had the highest concentration of high-consumption owner-occupied households.

CONCLUSIONS AND RECOMMENDATIONS

➡ ***Conclusion 1:*** **Since 2008, awareness of Energy Trust has improved in most parts of Oregon.** Though we did not explicitly track what marketing channels had attracted people's attention, the findings suggest that the 2009 marketing efforts increased overall recognition of Energy Trust and may have successfully affected program participation.

> ***Recommendation 1:*** The next Oregon Residential Energy Awareness Study should include questions that obtain unaided responses as to respondents' awareness of different marketing messages offered about Energy Trust (i.e., those by the utilities and Energy Trust).

➡ ***Conclusion 2:*** **Six different market segments were identified from the 2009 survey analysis, some of which are similar to the ones identified in the 2008 study**. The differences are likely attributable to changes in the survey questions and improved renter samples in 2009.

- **Maybe Later** – young renters with green attitudes
- **Strugglers** – renters in survival mode
- **Show Me** – Eastern Oregonians who are less receptive to energy efficiency
- **Hands Full** – large families with lower incomes and lower perception of the efficacy of energy efficiency
- **Willing and Able** – financially capable, higher energy consumers with greener attitudes
- **Main Street Oregonians** – non-urban residents who are receptive to green living

Three segments – *Strugglers*, *Willing and Able*, and *Main Street Oregonians* – are similar to the ones we identified in the 2008 study regarding energy efficiency attitudes and demographic characteristics

Willing and Able and *Main Street Oregonians* are the most attractive market segments to Energy Trust, since they include the most high energy consumers and are more likely to

participate in Energy Trust programs, given their high financial and attitudinal readiness to be engaged in efficiency actions.

The *Maybe Later* households are less likely to participate in Energy Trust programs today, primarily because of their young age, rental status, and financial constraints. This segment exhibits a strong desire to become more energy-efficient; therefore, they have the greatest potential to become an attractive segment for Energy Trust, as they earn more money and become homeowners.

The *Show Me* segment, on the other hand, appears to have the capacity to take many efficiency actions, but they are less aware and less convinced of the benefits they might experience by taking such actions.

> ***Recommendation 2:*** **Design programs that primarily target the *Willing and Able* and *Main Street Oregonian* segments, as these include those residents most likely to participate and provide energy savings**. Enhanced marketing efforts that target the *Maybe Later* and *Show Me* segments could be effective by increasing their awareness of the benefits of taking energy efficiency actions and by targeting low-cost/no-cost actions that could have immediate effects.

➡ ***Conclusion 3:*** **Renters are interested in learning what they can do to reduce energy use**. Renters, who tend to be younger, are generally more uneasy about current energy issues than are homeowners, and were the most interested in learning what they can do to reduce their environmental footprint. Simultaneously, they expressed their lack of knowledge or access to means to do so.

> ***Recommendation 3:*** **Actively engage renters by promoting CFLs and low-cost/no-cost measures through creative communication channels such as YouTube, Twitter, and other Web2.0 and 3.0 tools, and by exploring program options that can influence landlord decision-making.**

➡ ***Conclusion 4:*** **A larger sample of customers with energy consumption billing data could provide a more meaningful segmentation analysis.** Information provided by the cases with consumption data was used to determine the key variables for the segmentation analysis. Thus, reducing the amount of missing billing data will improve the reliability and consistency of segmentation solutions.

> ***Recommendation 4:*** **Energy Trust should explore how to ensure that future surveys have access to samples that include energy consumption data upfront,** rather than matching energy consumption data to RDD-sampled households**.**

➡ ***Conclusion 5:*** **The use of behavioral and attitudinal variables was effective in identifying segments.** The largest change in survey questions for the 2009 sample was to expand the questions addressing behavioral and attitudinal variables. This proved to be a

more effective basis for the segmentation analysis and was especially valuable due to the lack of billing data.

Recommendation 5: **Continue to use behavioral and attitudinal questions in surveys that will be used for segmentation analysis**. These questions can be refined further and perhaps expanded to further account for drivers in customer decision-making about energy efficiency.

Energy Trust of Oregon
851 SW Sixth Avenue, Suite 1200
Portland, Oregon 97204

Telephone: 1.866.368.7878
Facsimile: 503.546.6862
energytrust.org

EnergyTrust of Oregon

MEMO

Date: December 4, 2009
To: Board of Directors
From: Sarah Castor, Evaluation Project Manager
Amber Cole, Director of Communications and Customer Service
Brooke Graham, Residential Marketing Manager
Subject: Staff Response to the 2009 Oregon Residential Awareness and Perceptions Study

The 2009 Oregon Residential Awareness and Perceptions Study is the second such study Energy Trust has completed, following on last year's report. The goals of the study were: 1) to gather information about the level of awareness Oregonians have of Energy Trust; 2) to compare awareness and participation with similar figures from last year's study and 3) to better understand attitudes and behaviors surrounding the topics of energy efficiency, renewable energy and climate change.

The 2009 Oregon Residential Awareness and Perceptions Study provides results based on a representative sample of both homeowners and renters statewide. While the vast majority of respondents reside in Energy Trust service territory, the sample includes some other electric and gas utility customers who are not eligible for Energy Trust programs and services.

Of the population surveyed (approximately 900), 36% were aware of Energy Trust and about 7% reported that they have participated in one of our programs. These figures grow to 41% and 9%, respectively, when filtering for respondents located in Energy Trust service territory.

From 2008 to 2009, awareness of Energy Trust increased among all four participating utility customer groups, and in all but one region (Southern Oregon, where awareness remained constant). As in 2008, the highest awareness is concentrated in the Portland Metro area, particularly among PGE and NW Natural customers.

We are pleased with the high levels of satisfaction and intention of repeat participation among past participants. However, we are conscious of the need to extend our reach in electrically heated homes and households outside the Portland area. To address this need, the proposed Energy Trust 2010 budget increases investment in general outreach, trade ally network recruitment and training, and targeted residential program marketing activities in outlying areas

with the purpose of increasing customer awareness and participation outside of the Portland metropolitan region.

The study noted a low penetration of programmable thermostats, and among households with such a device, very few used the automatic setbacks. In 2010, the Home Energy Solutions – Existing Homes program will pilot programmable thermostat installations and education during Home Energy Reviews to assess the potential savings.

The study identified six customer segments based on energy usage and respondent attitudes and behaviors around energy and climate change. Two segments – “Willing & Able” and “Main Street Oregonians” – were recommended for program targeting. In addition, different marketing messages and strategies were recommended for “Maybe Later” and “Show Me” segments. Energy Trust advertising and communications will build on this learning to target specific messaging to specific audiences where possible. This strategy will ultimately be balanced with general messaging to reach all, including the “Strugglers” and “Hands Full.” We plan to deploy some of these targeted messages to relevant customer segments in 2010 and then follow up to measure effectiveness in the future Residential Awareness studies.

In 2010, we intend to field the survey again, but with a reduced set of questions, to track trend in awareness, participation, and explore other specific topics of interest. We do not plan to repeat the segmentation in 2010 because we have a solid understanding of the current customer segments and opportunities to employ targeted marketing strategies for specific segments. We will watch for indications that targeted efforts, where they can be utilized, contribute to overall awareness gains.

As recommended, we also plan to explore different sampling approaches to increase the amount of billing data that can be matched to respondents.

1 INTRODUCTION

In March 2009, Energy Trust of Oregon (Energy Trust) contracted with Research Into Action, Inc. to conduct the second Residential Energy Awareness and Perception Study about general understanding and perceptions of energy efficiency and renewable energy among residential electric and natural gas customers within Energy Trust's service territory in Oregon.

STUDY PURPOSE

The purpose of the Residential Energy Awareness and Perception Study is to understand Energy Trust customers' general interest, awareness, and perceptions regarding energy use, energy efficiency, renewable energy, and related topics. Study results will be used to help design and support marketing and implementation of current and future Energy Trust programs and campaigns. Based on insights gained in the 2008 study and discussions with Energy Trust, we examined the following research areas in 2009:

- Awareness of Energy Trust
- Awareness of Energy Efficiency
- Awareness of Renewable Energy
- Attitudes and Perceptions About Curtailing Energy Use
- Energy Use Behaviors
- Customer Demographics
- Housing Characteristics

Using these findings, we also sought to develop meaningful market segments, differentiated by the survey participants' demographic and behavioral characteristics. The purpose of this segmentation analysis is to enable Energy Trust to design and implement marketing efforts to reach residential customers more effectively.

When possible, we also compared the 2008 and 2009 results to identify trends.

ORGANIZATION OF THIS REPORT

This report is organized into five sections. Following this introductory chapter, we discuss the methodology of the study, including the sampling approach. The third and fourth chapters present the findings; Chapter 3 provides a question-by-question analysis, while Chapter 4 focuses on the segmentation analyses. We present our conclusions and recommendations in

Chapter 5. The appendices include: the survey questionnaire; disposition summary; ZIP-code breakouts for sampling; segmentation analysis method; and additional segmentation analysis.

2 METHODOLOGY

This chapter describes the procedures that governed data collection and analysis to ensure the research produced a representative sample, reliable data, and sound analyses.

SURVEY INSTRUMENTS

In order to develop the 2009 survey instrument, Energy Trust, Research Into Action, and Opinion Dynamics Corporation (ODC)[1] staffs reviewed the 2008 research issues and questions. Many questions from the 2008 survey instrument could be included in the 2009 questionnaire; we omitted inquiries that failed to capture meaningful information in the 2008 study and added questions to address previously unexplored research areas. The past studies that served as references included:

- *Residential Segmentation Questionnaire, Puget Sound Energy, 2008*
- *Residential Website Survey, Energy Trust of Oregon, 2007*
- *2006 Energy Conservation, Efficiency, and Demand Response, Schulman, Ronca and Bucuvalas, Inc., 2006*
- *2008 Energy Conservation, Efficiency, and Demand Response, Schulman, Ronca and Bucuvalas, Inc., 2008*
- *2001 Residential Energy Consumption Survey, U.S. Department of Energy, Energy Information Administration, 2001*
- *2004 California Statewide Residential Appliance Saturation Study*

ODC also included questions from the *2007-2008 Home Energy Solutions* program evaluation to better understand nonparticipants in the 2008-09 Home Energy Solution Program. We did not analyze these questions.

The survey questionnaire was primarily closed-ended, with a few opportunities for interviewers to capture verbatim responses. We included several screening questions to ensure that we contacted those who made the decisions about the households' energy use; that the households were used as a residence, not for business; and that we minimized response bias by not interviewing household members who were utility employees.

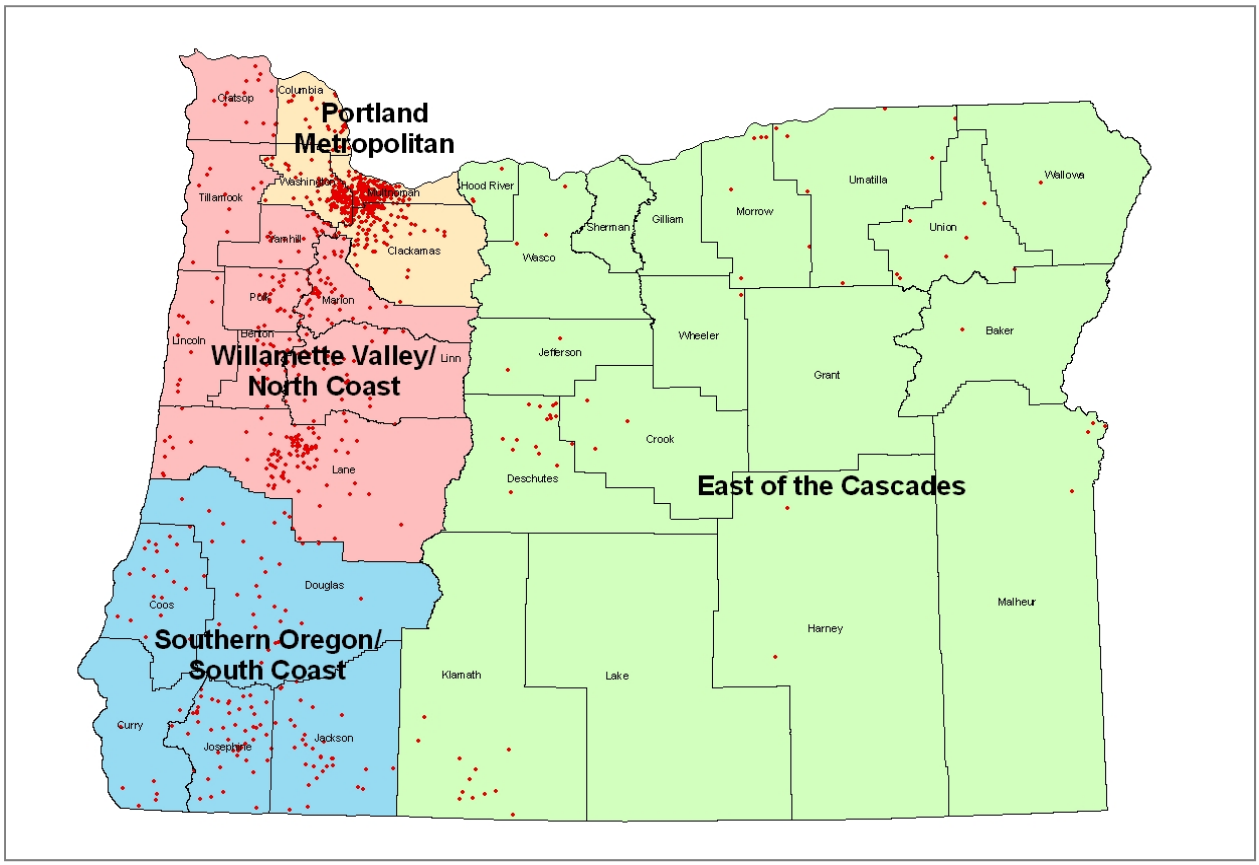
[1] Opinion Dynamics Corporation (ODC) was contracted to conduct the telephone surveys that formed the basis for this study.

ODC pre-tested the survey questionnaire with 15 initial respondents on May 6, 2009. The final instrument is included in Appendix E.

SAMPLING

Energy Trust provides services to customers of Oregon's investor-owned electric and gas utilities – Portland General Electric (PGE), PacifiCorp, NW Natural, Cascade Natural Gas, and until 2009 Avista. These utilities serve rural and urban customers throughout Oregon, including those in most of the metropolitan areas in the state. Thus, the population for this study includes electric and/or natural gas customers throughout Oregon, which is slightly larger than the customer base that Energy Trust's territory covers. Using ZIP codes, we identified four geographic areas that would be most useful for this study: Portland Metropolitan, Willamette Valley/North Coast, Southern Oregon/South Coast, and East of the Cascades (Appendix B). Figure 2.1 shows the four regions and each dot indicates the location of a household that participated in the 2009 study.

Figure 2.1: Sampling Map



We selected quota variables that would accurately reflect the demographic proportions from the census. Table 2.1 shows proportions from the census and the completed interviews within each

quota variable. A goodness-of-fit test confirmed that the sample frequencies of these variables did not significantly deviate from the census frequencies.

Table 2.1: Sampling Quota

CHARACTERISTIC	CENSUS* PERCENT	SAMPLE	
		FREQUENCY	PERCENT
REGION			
Portland Metropolitan	44%	421	47%
Willamette Valley / North Coast	30%	273	30%
Southern Oregon / South Coast	13%	109	12%
East of the Cascades	13%	101	11%
HOME OWNERSHIP			
Owner	65%	602	67%
Renter	35%	302	33%
HOUSING STRUCTURE			
Single-Family Home	68%	556	62%
Multifamily Home	23%	261	29%
Mobile Home and Other	9%	87	10%
AGE OF RESPONDENT			
24 Yrs or Younger	5%	20	2%
25 to 34 Yrs	17%	132	15%
35 to 44 Yrs	19%	172	19%
45 to 54 Yrs	22%	208	23%
55 to 59 Yrs	10%	94	10%
60 to 64 Yrs	7%	80	9%
65 to 74 Yrs	10%	102	11%
75 Yrs or Older	10%	96	11%

* Census data were obtained from the *2005 to 2007 American Community Survey* and the *2000 Decennial Census*, both from the U.S. Census Bureau.

However, the frequencies of owners and renters differed substantively from the census frequencies within each of the four regions (Table 2.2). To understand these, we explored both the main and interaction effects of regional differences and home ownership by conducting a

series of regression and loglinear analyses[2] that included region, ownership, and their interaction terms on key selected outcome variables. These analyses where chosen to detect any systematic interactions across home ownership within the four regions. We found just a few significant interaction effects, mainly with renters in Eastern Oregon. Although applying weights to these cases was considered, we determined that this would have minimal effect to the outcome due to the small number of cases (n=22) and concluded that there was no need to employ weights to the 2009 sample.

Table 2.2: Proportion of Rental Units in Each Region

RENTAL UNIT PROPORTION	PORTLAND METRO	WILLAMETTE VALLEY / NORTH COAST	SOUTHERN OREGON / SOUTH COAST	EAST OF THE CASCADES	TOTAL
Census 2000	38%	36%	31%	31%	36%
Sample	43%	25%	29%	22%	33%

The resulting sample size of 904 was sufficient to achieve an overall confidence/precision of 95% / ±4%, and 95% / ±10% within each geographic region.

The samples of 2008 and 2009 studies provided, respectively, ±3% and ±4% precision. The combined error bound is even larger when 2008 and 2009 data are compared. Therefore, when 2008 and 2009 comparisons are made, we intend to describe changes as possible trends, rather than describing them with statistical confidence.

DATA COLLECTION AND ANALYSIS

ODC's call center conducted the telephone interviews using a computer-assisted-telephone-interview (CATI) system between May 6 and July 28, 2009. Interviews occurred during the day, evening, and weekend hours.

Research Into Action found 119 cases with anomalous data. To replace these with accurate cases, ODC conducted an additional 120 interviews whose demographic characteristics closely matched the 119 dropped cases; the new interviews were added to the rest of the sample after Research Into Action examined them carefully and found no apparent issues.

To counteract non-response bias, ODC made up to twelve attempts per telephone number to complete the surveys. ODC also took care to achieve appropriate quotas by using the fewest telephone numbers necessary. The average length of the survey was 23 minutes, which included

[2] Loglinear analysis deals with the association of categorical or grouped data, and looks at all levels of possible main and interaction effects. It extends beyond traditional approaches, using chi-square and other measures of significance, by providing the advantage of analyzing multi-way tables that involve three or more categorical variables.

the screening questions. The response rate was 10.4%. Detailed final dispositions are provided in Appendix A.

We analyzed the completed survey data using *SPSS Version 17* statistical software. All procedures employed for the step-by-step data cleaning and data transformation, as well as the statistical analyses, were documented in a syntax file. The analytic approaches are explained in more detail in Section 3.

3 QUESTION-BY-QUESTION FINDINGS

This chapter discusses the result of the survey's question-by-question analyses. Although we generally analyzed each survey question independently, on occasion we combined some questions or transformed data by recoding or computing variables to gain more meaningful information.

When possible, key responses were compared by appropriate demographic, participant/ nonparticipant, census, and other available statistics. We then conducted a statistical analysis of the differences between assumptions about respondents' awareness of Energy Trust, participation in Energy Trust programs, energy use, and general or specific attitudes or perceptions about energy consumption. When possible, the 2009 and 2008 data were also compared.

The analyses in this chapter include the following topics:

- Awareness of Energy Trust
- Participation in Energy Trust Programs
- Self Assessment of Home Energy Efficiency
- Attitudes, Perceptions, and Beliefs
- Home Features and Energy Use Behaviors
- ENERGY STAR®
- Renewable Energy
- Intention to Participate in the Future

As noted earlier, the questions ODC included for its *2007-2008 Home Energy Solutions* program evaluation were not analyzed.

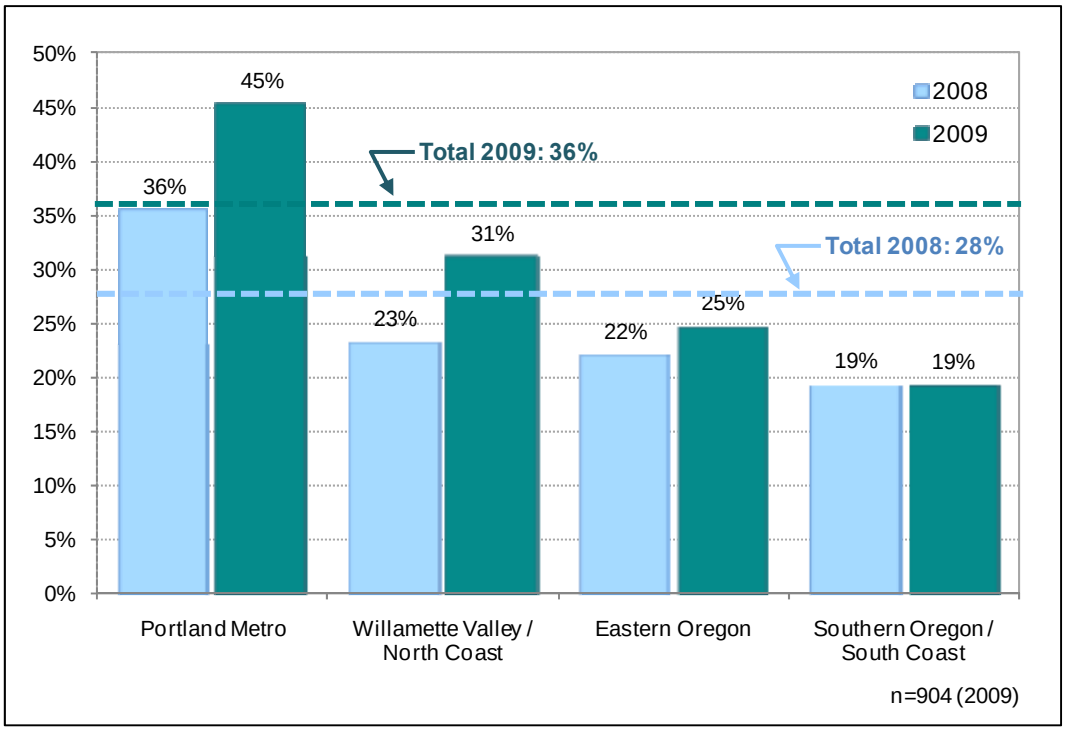
AWARENESS OF ENERGY TRUST

At the beginning of the survey, without explanatory prompting, respondents were asked if they had heard of Energy Trust of Oregon. Figure 3.1 shows the results by region and compares them to the 2008 results. A total of 36% in the 2009 survey reported they had heard of Energy Trust,

compared to 28% in 2008.[3] This improvement was observed in most of the regions, and most significantly in the Portland Metropolitan area (45% vs. 36% in 2008, a 9-point increase) and in the Willamette Valley/North Coast area (31% vs. 23%, an 8-point increase). The reported awareness within the Energy Trust territory[4] was at 41% (a 9-point increase from 2008).

The regional differences in respondents' awareness of Energy Trust in 2009 was statistically significant ($p<.05$). The Portland Metropolitan area had the highest level of Energy Trust awareness (45%), followed by the Willamette Valley/North Coast (31%), East of the Cascades (25%), and Southern Oregon/South Coast (19%) areas.

Figure 3.1: Unaided Awareness of Energy Trust by Region



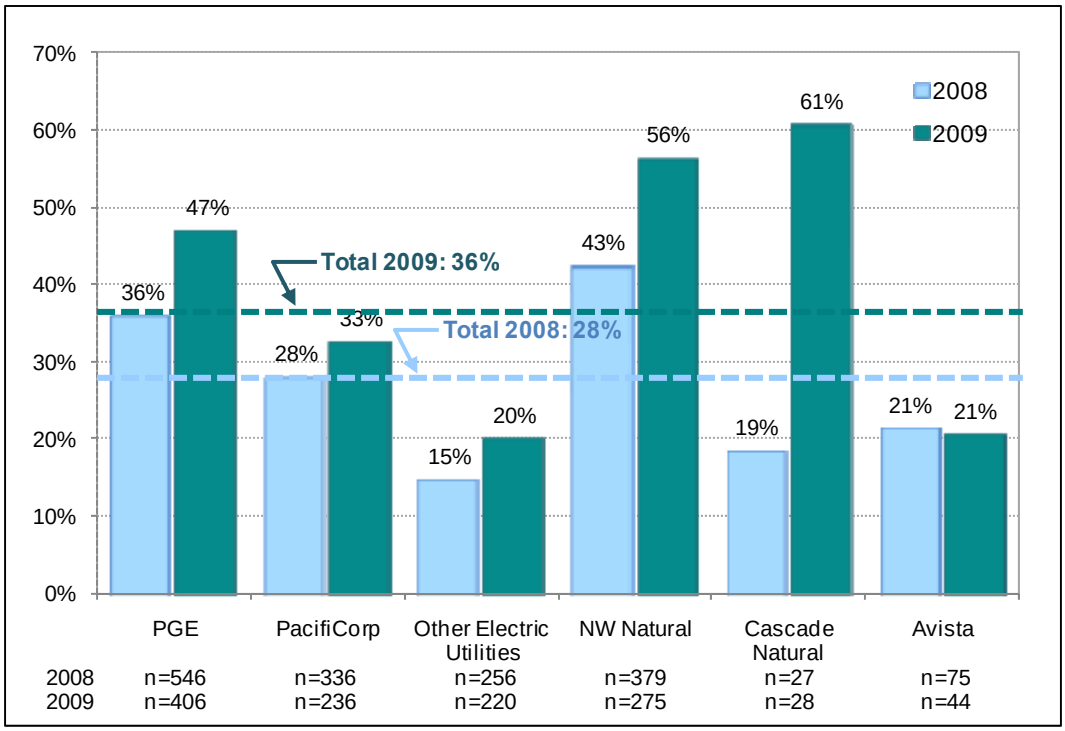
We also compared awareness of Energy Trust by respondents' electric and natural gas utilities (Figure 3.2). Compared with the 2008 results, higher awareness levels were reported in 2009 by

[3] The 2008 study asked an aided awareness question rather than eliciting an unaided response, making the difference between 2008 and 2009 more notable (unaided awareness is usually lower than aided awareness).

[4] If the respondent's electric and/or natural gas utilities are PGE, Pacific Corp, NW Natural, or Cascade Natural, the respondents were considered residing within the Energy Trust territory (Avista was included in 2008). Those who reported "don't know" or "refused" of their utilities are excluded from the analysis.

respondents of all of the utilities but Avista.[5] The increase of awareness reported by the respondents of PGE (47%, +11 percentage points), NW Natural (56%, +13 percentage points), and Cascade Natural (61%, +42 percentage points) were particularly notable.

Figure 3.2: Unaided Awareness of Energy Trust by Utility

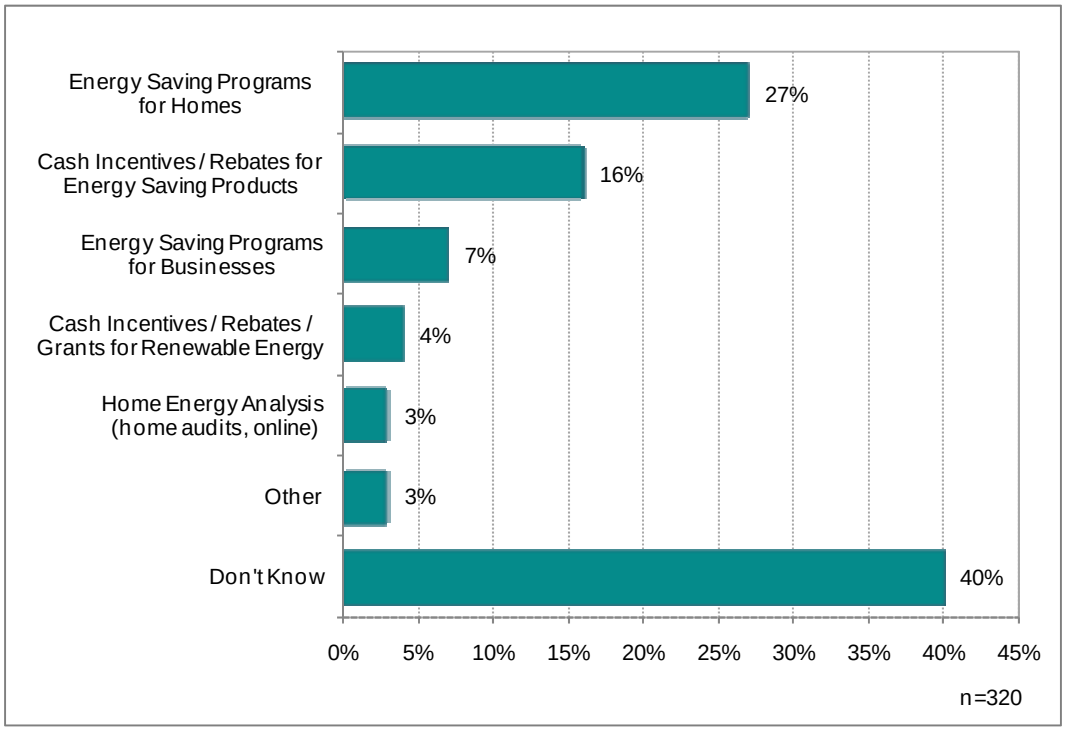


The respondents who said they were aware of Energy Trust were asked an open-ended question about their knowledge of Energy Trust programs. This question had several pre-coded categories; "Other" responses were re-categorized appropriately. Figure 3.3 shows the responses by types of programs.

The most common program type the respondents mentioned was the energy-saving program for the residential sector (27%), followed by cash or rebate programs for energy-saving products (15%). About 7% reported they were aware that Energy Trust offered energy-saving programs for the commercial and industrial sectors. Only a small portion of the respondents said they were aware of Energy Trust's incentive programs for renewable energy solutions (4%) or home energy analysis services (3%). However, of all the respondents who recognized the Energy Trust name, 40% reported they knew nothing about Energy Trust programs.

[5] Energy Trust provided services to Avista customers until December 31, 2008.

Figure 3.3: Knowledge of Energy Trust's Program Offerings

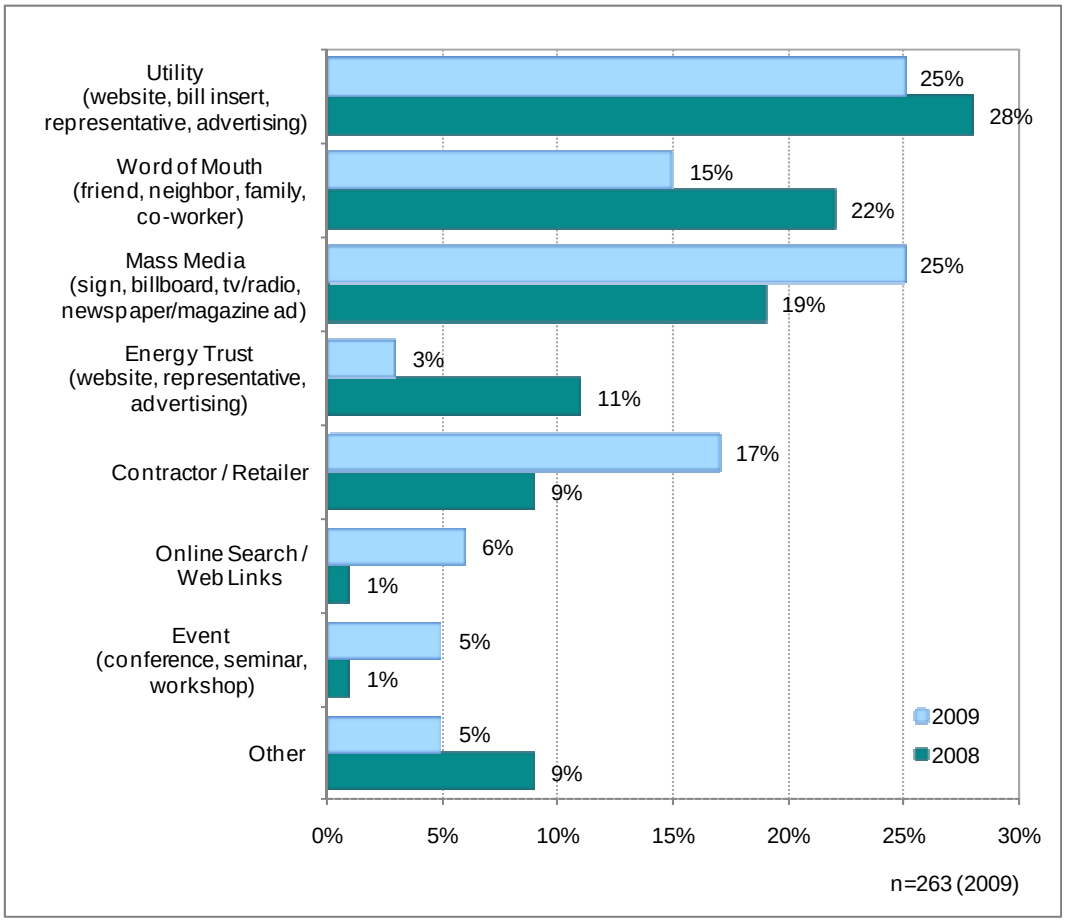


In addition, we asked these respondents an open-ended question about how they first heard about Energy Trust and its programs (Figure 3.4). The question had pre-coded categories, and "Other" responses were re-categorized appropriately.

The most common way (28%) the respondents first learned about Energy Trust was through their utility – most frequently through the utility's bill insert, direct mail, website, or through direct contact with representatives. Twenty-two percent of respondents mentioned word-of-mouth contact as a primary way of learning about Energy Trust. Nineteen percent said that mass media (e.g., signs, billboards, newspapers, magazines, TV, or radio) contributed to their recognition of Energy Trust, while 11% identified Energy Trust's website and representatives, and 9% named Energy Trust's partner contractors as their first source of information. A very few respondents (2%) reported they first learned about Energy Trust during an online search or through attendance at events.

Comparing these with the 2008 results, a higher percentage of respondents said they first learned about Energy Trust through their utilities, word-of-mouth contacts, and sources provided by Energy Trust. A lesser percentage of the respondents reported mass media or a contractor as their initial source of information about Energy Trust.

Figure 3.4: Source of Initial Information About Energy Trust



The survey also examined respondents' awareness of the Oregon Residential Energy Tax Credit (RETC) for installing certain energy-saving equipment or renewable energy systems (Table 3.1). Seventy-one percent of the respondents reported they were aware of the program. Compared with the 2008 result, there was virtually no improvement in 2009.

Table 3.1: Awareness of State Residential Energy Tax Credit

AWARENESS	2008	2009
Aware of Oregon Residential Energy Tax Credit (RETC)	70.7%	71.1%

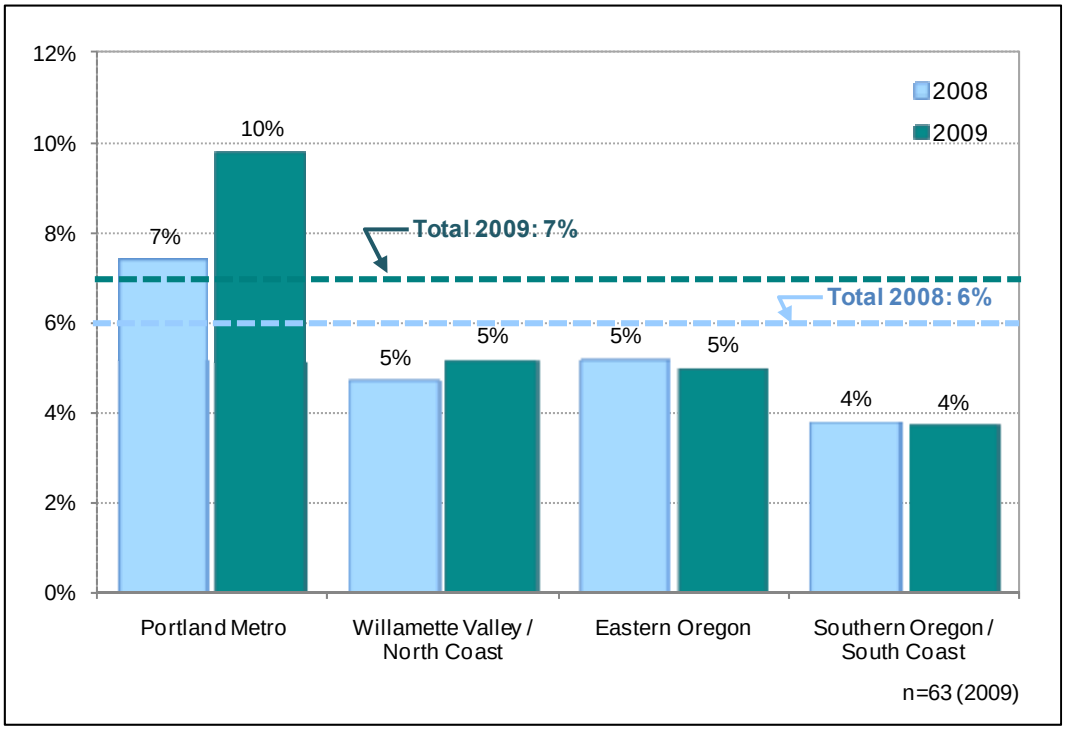
PARTICIPATION IN ENERGY TRUST PROGRAMS

We considered the respondents who reported participating in Energy Trust programs or had received a rebate check from Energy Trust to be participants in Energy Trust programs. The 2009 survey revealed that the overall participation rate in the state was 7.1%; it was at 9% in the

Energy Trust territory. The participation rate in the 2008 survey was 5.8% in the state and 6.9% in the Energy Trust territory – these differences are within the margin of error.

Figure 3.5 compares the participation rate in Energy Trust programs by region for 2008 and 2009. The Portland Metropolitan area has a significantly higher participation rate (10%) than the other regions (4% to 5%, $p<.05$). The Portland Metropolitan area also experienced a substantial increase (3 points, or 43%) in participation from last year, while participation in other regions essentially stayed the same as in 2008. The increased participation rate in the Portland Metropolitan area accounts for almost all of the overall increase in the participation rate since 2008.

Figure 3.5: Participation in Energy Trust Programs by Region



We also compared participation rates per respondents' electricity and natural gas providers (Figure 3.6 and Figure 3.7). Among Oregon's electricity providers, given the high participation rate in the Portland Metropolitan area, it is not surprising that a significantly higher percentage of PGE customers (11%) reported they had participated in Energy Trust programs in 2009 than customers of other electricity providers ($p<.05$). Customers of both PGE and EWEB reported an increase (2 and 4 percentage points, respectively) in participation in 2009 over 2008. Participation by PacifiCorp customers changed little between 2008 and 2009.

Figure 3.6: Participation in Energy Trust Programs by Electricity Provider

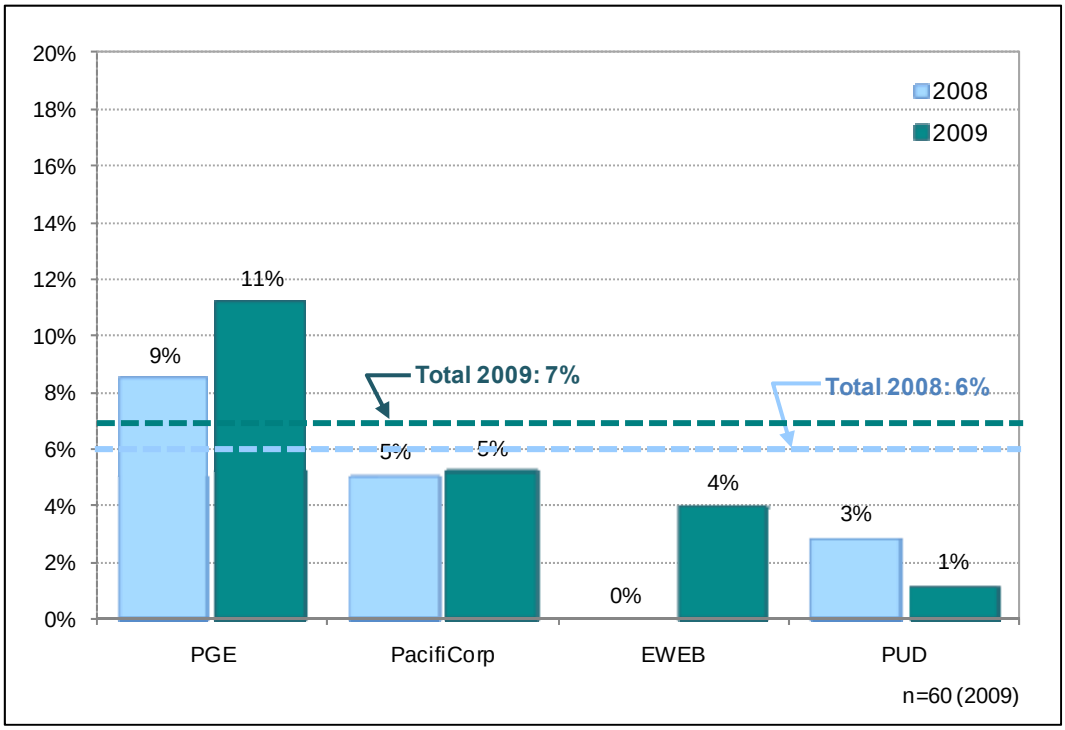
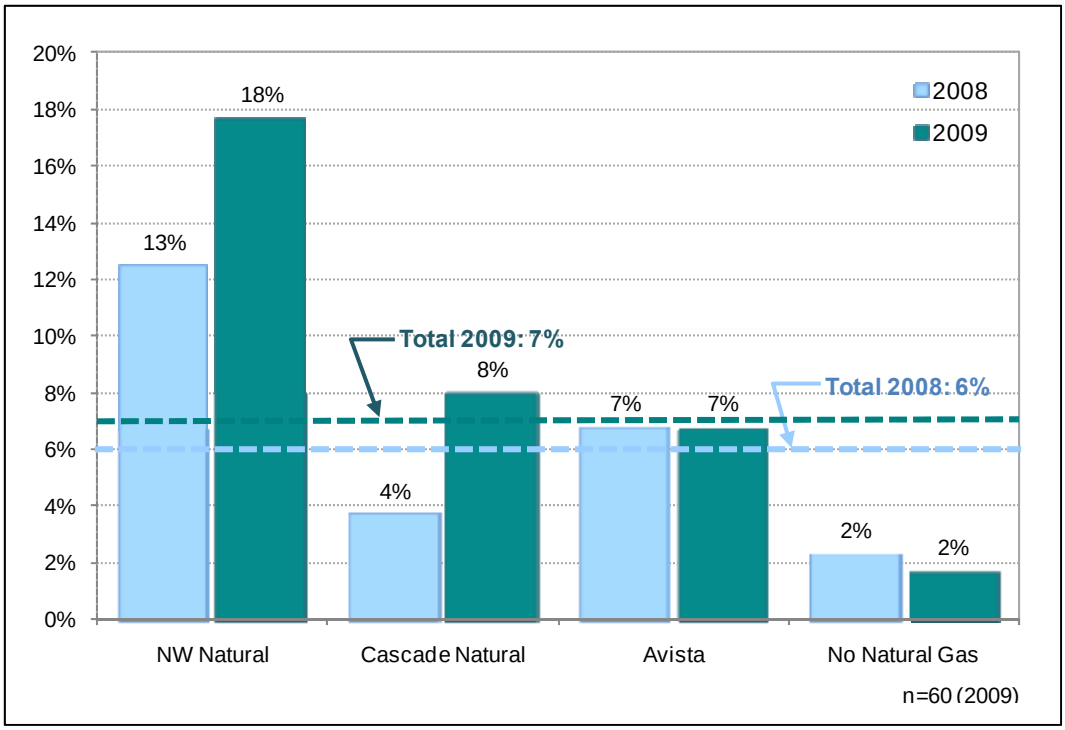


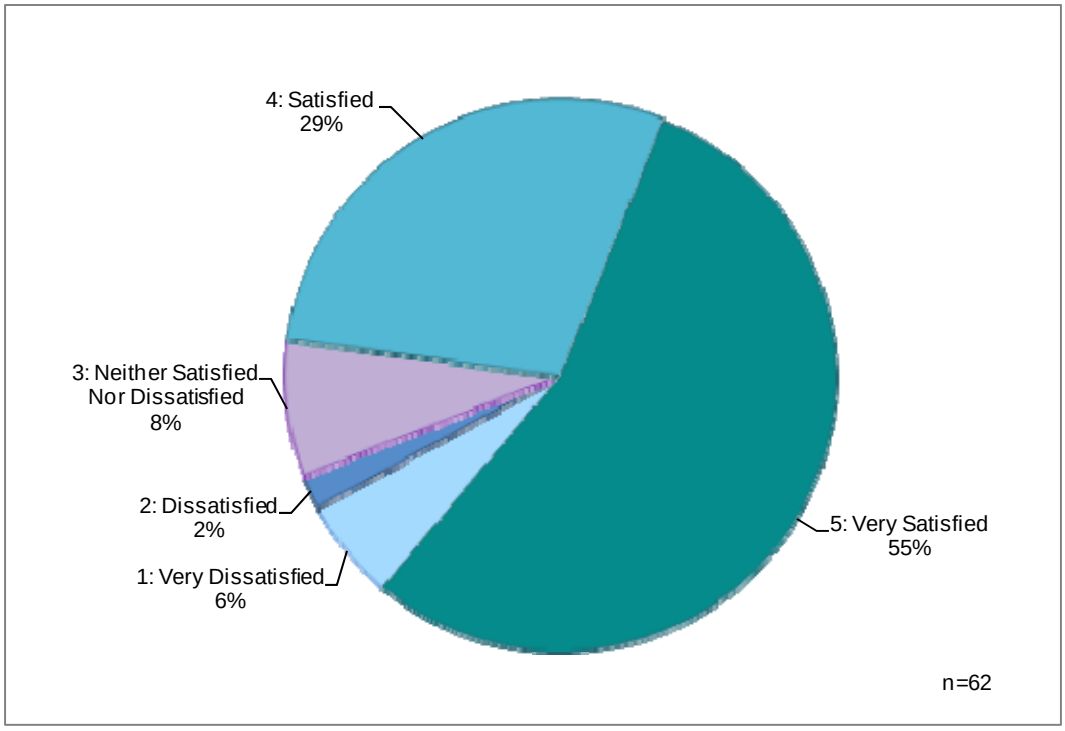
Figure 3.7: Participation in Energy Trust Programs by Natural Gas Provider



Participation in Energy Trust programs among customers of NW Natural and Cascade Natural also increased in 2009, growing from 13% to 18% and from 4% to 8%, respectively. The differences in 2009 participation rates between customers of NW Natural and those of other natural gas providers are statistically significant ($p<.05$).

When participants were asked about their experiences with Energy Trust program participation, 84% of the 62 participants respondents reported they were satisfied or very satisfied with their participation experiences(Figure 3.8). Only 8% indicated a level of dissatisfaction with their participation. One participant indicated that their dissatisfaction was due to receiving a smaller rebate than had been expected and another said that Energy Trust had rejected a rebate application for a product purchase.

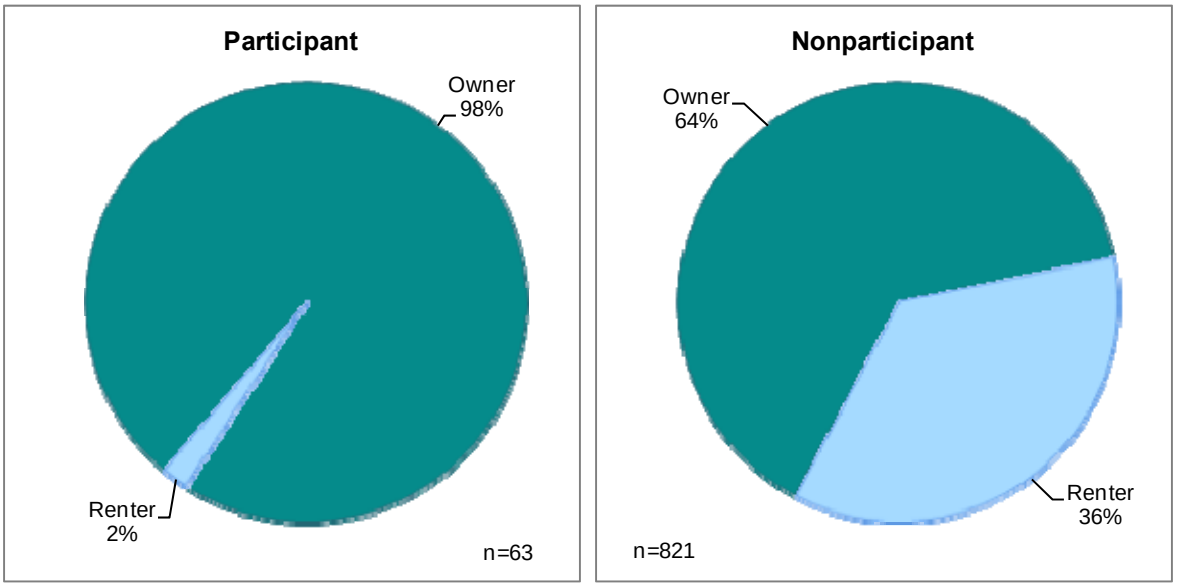
Figure 3.8: Experience with Energy Trust Participation



Characteristics of Participants

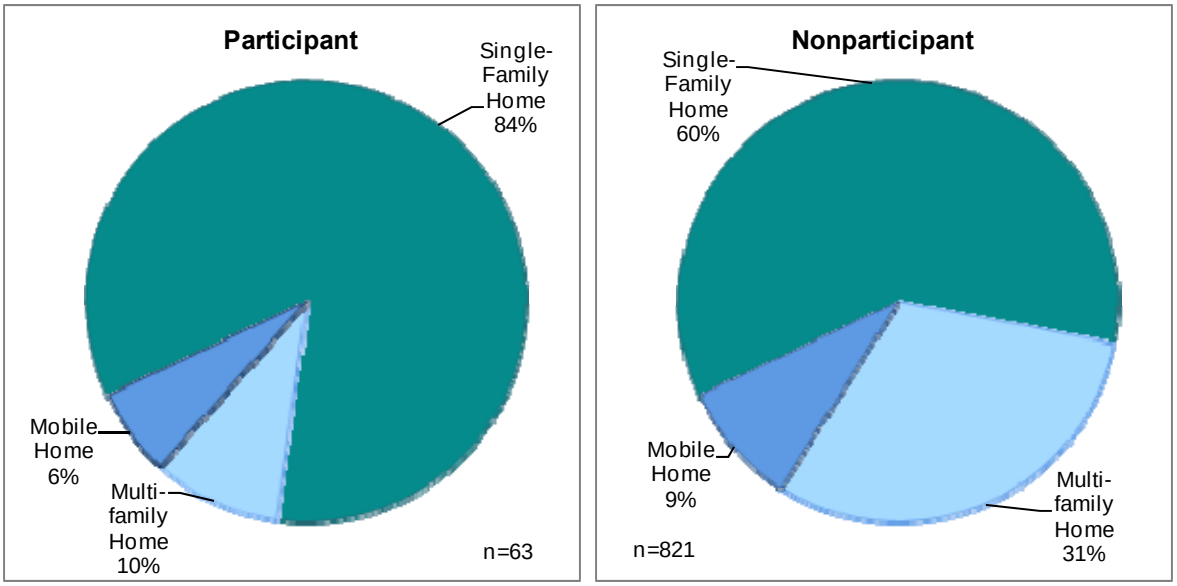
To explore participant and nonparticipant characteristics further, we examined several key demographic variables in depth. Figure 3.9 compares home ownership rates of participants and nonparticipants. Participants were overwhelmingly homeowners (98%); just 2% of participants were renters. Nonparticipant homes were consistent with census results, with owner-occupied homes accounting for 64% and renter-occupied homes accounting for 36% of the total. This difference in home ownership by participation is significant ($p<.05$).

Figure 3.9: Home Ownership by Energy Trust Participation Status



As shown in Figure 3.10, the kind of housing in which participants resided also differed significantly from those in which nonparticipants lived ($p<.05$). Most (84%) of the participants' homes were single-family detached structures; only a small portion of participants lived in multifamily (10%) or mobile (6%) homes. On the other hand, although a majority of nonparticipants lived in single-family homes, more than a quarter (31%) of them lived in multifamily homes and another 9% lived in mobile homes.

Figure 3.10: Types of Homes by Energy Trust Participation Status



The age of participants' homes did not differ significantly from the age of nonparticipants' homes (Figure 3.11). Slightly more than half of the housing stock in Oregon was built prior to 1980; about half of those structures (or about one-fourth of the total housing stock) were built prior to 1960. Homes built after 2000 accounted for slightly over 10% of the total residential housing stock.

Figure 3.11: Year Home Built by Energy Trust Participation Status

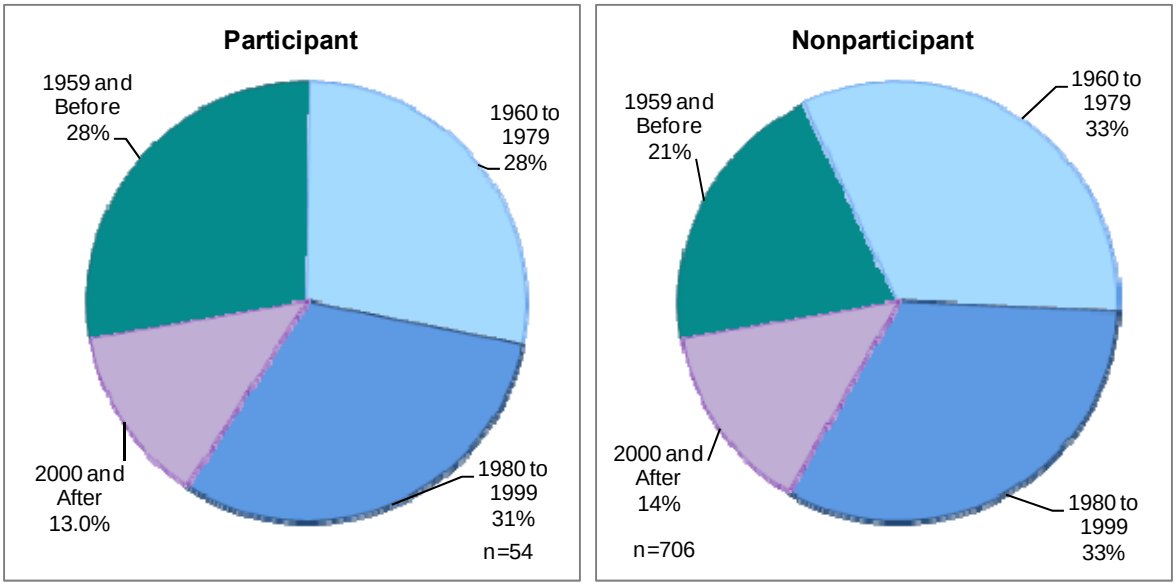
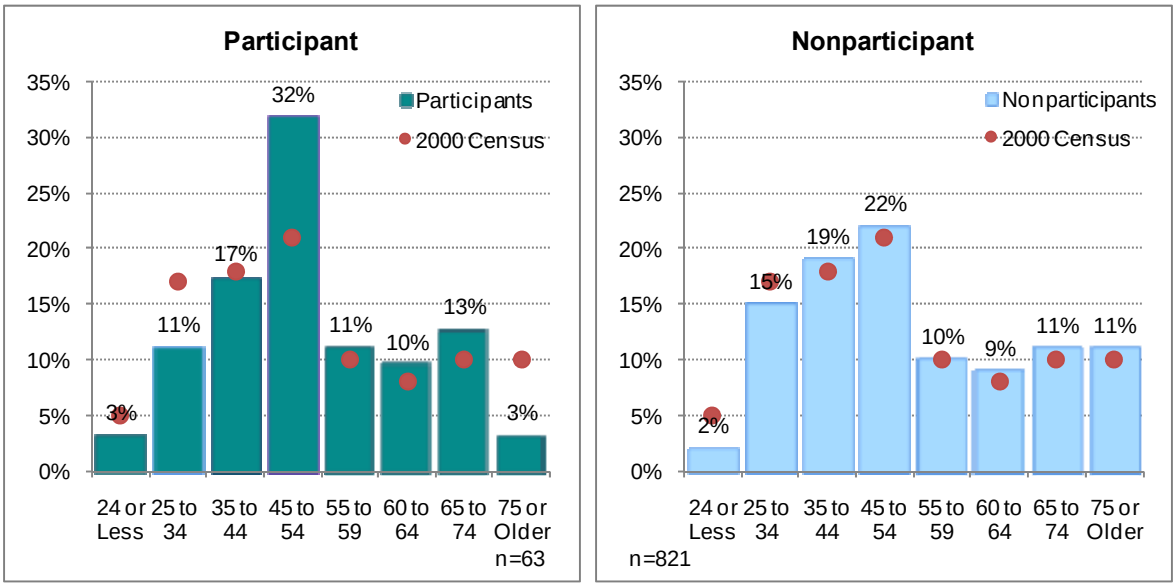


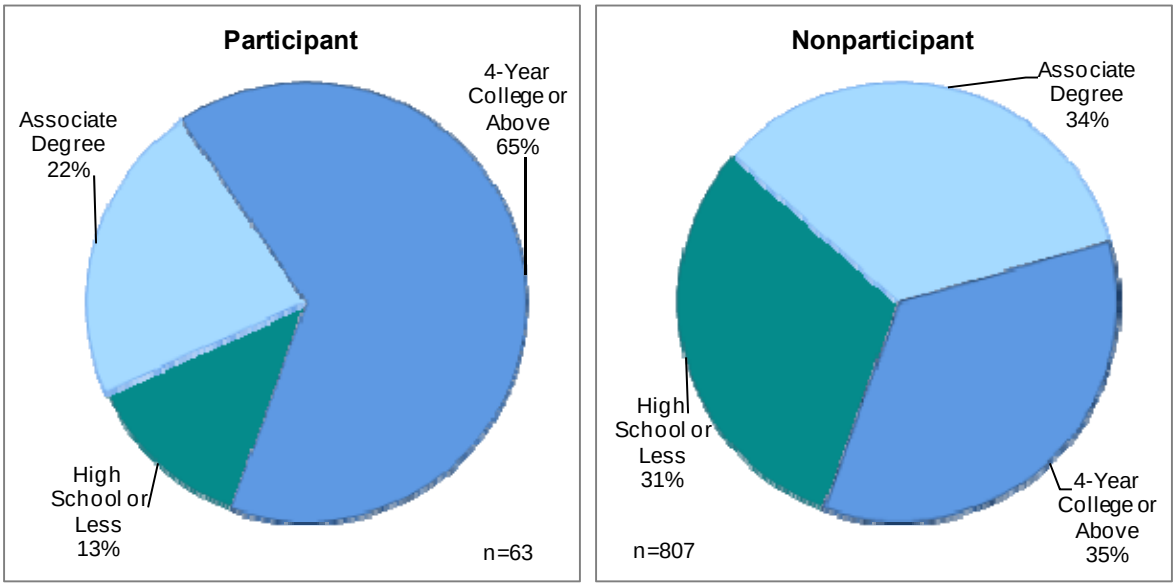
Figure 3.12 shows the distribution of the primary household member's age for participants and nonparticipants, and compares that information to census data. Although the distributions were not significantly different between the two groups, household members who were 45 to 54 years old appeared to participate in Energy Trust programs more frequently than those in other age groups. The proportion of the participants in this age bracket is distinctly higher than the proportion suggested by the census and nonparticipant information. The 2008 result also supports this finding.

Figure 3.12: Age of Primary Household Members by Energy Trust Participation Status



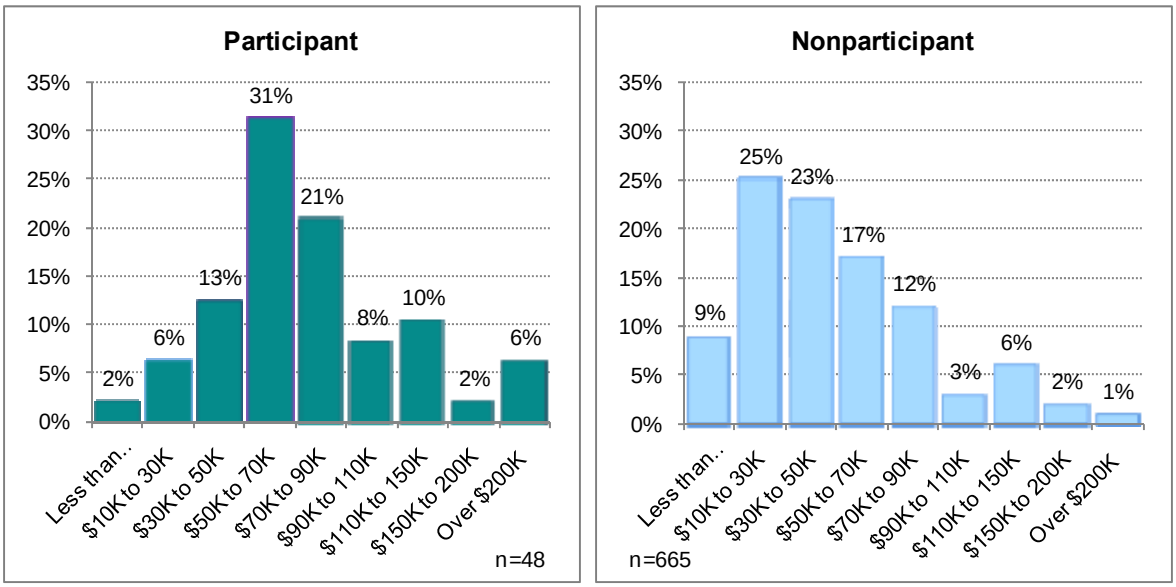
Next, we examined the difference between participants' and nonparticipants' education levels (Figure 3.13). Overall, participants were significantly more educated than nonparticipants ($p<.05$). Sixty-five percent of the participants had at least a four-year college degree, while only 35% of the nonparticipants had an equivalent education level. By contrast, the percentage of respondents with a high-school diploma or less, or an associate degree, was significantly smaller among participants (13% and 22% respectively) than among nonparticipants (31% and 34% respectively).

Figure 3.13: Education Level by Energy Trust Participation Status



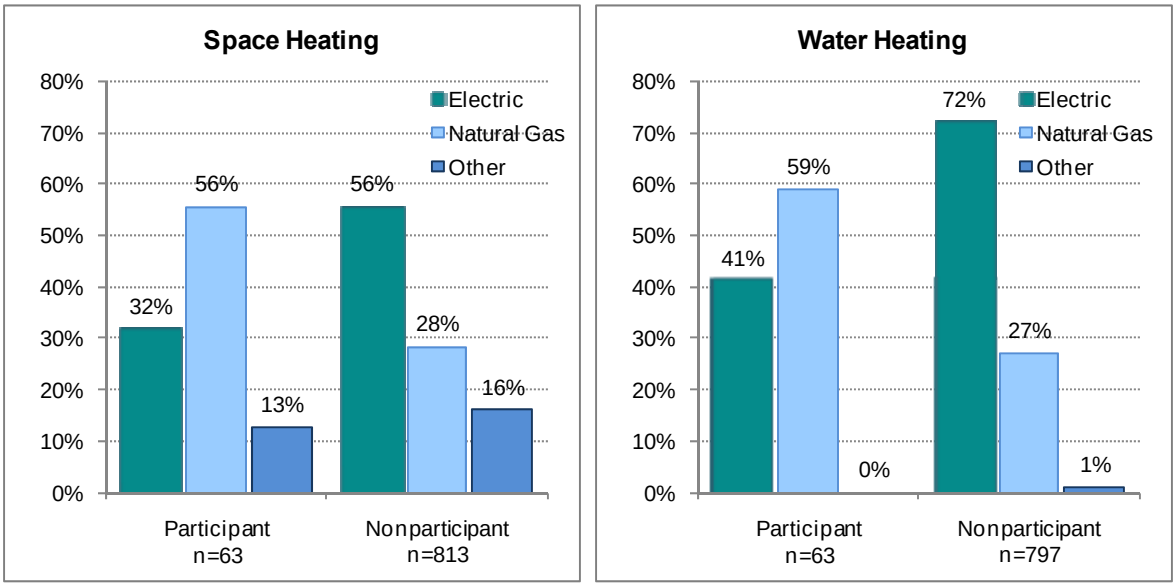
As shown in Figure 3.14, participants' total household income also was significantly higher than nonparticipants' ($p<.05$). The total household income of more than half of the nonparticipants (57%) was less than $50,000, whereas only 21% of the participants reported a total household income of less than $50,000. Furthermore, 26% of the participants reported that their total household income exceeded $90,000, while only 12% of the nonparticipants reported a similar income level.

Figure 3.14: Income Level by Energy Trust Participation Status



Finally, we examined differences in primary fuel types used for space and water heating in participants' and nonparticipants' homes (Figure 3.15). The differences were significant ($p<.05$). A majority of participants used natural gas to heat both space and water (56% and 59%, respectively), while a majority of nonparticipants used electricity for space and water heating (56% and 72%, respectively). These findings are consistent with 2008 results.

Figure 3.15: Primary Fuel Types for Space and Water Heating by Energy Trust Participation Status



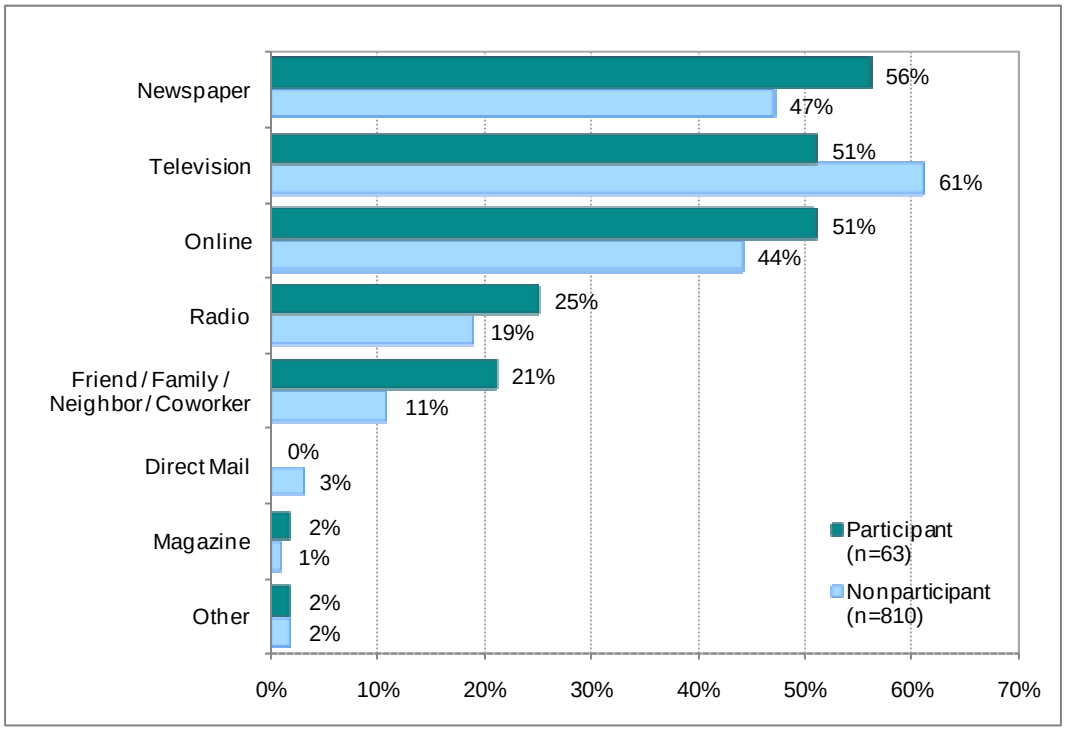
To determine which news and information sources Oregonians rely on, we asked respondents to identify their single most important source for news (Figure 3.16). The three most common sources reported by participants were newspapers (56%), television (51%), and the Internet (51%). Nonparticipants also frequently named these three sources, but television was by far more common than the two other sources; 61% of nonparticipants cited television as their primary news source. Obtaining news from radio and word-of-mouth communication through a network of friends, family members, neighbors, and coworkers were the next common responses; participants mentioned these more frequently (25% and 21%, respectively) than did nonparticipants (19% and 11%, respectively).

In sum, most demographic differences between participants' and nonparticipants' households seem to be associated with home ownership. Participants are predominantly homeowners, are more likely to live in single-family detached homes, have higher education, and earn higher household incomes.

The survey data do not explain statistical differences between participants and nonparticipants regarding the age of the respondents' homes or the household members' age. However, the data appear to suggest that respondents who were 45 to 54 years old were more eager to participate in Energy Trust programs.

Overall, 2009 findings of participants' characteristics are consistent with 2008 findings.

Figure 3.16: Primary News Source



Note: The percentages shown represent all of the sources identified by each respondent. Some respondents named more than one source; therefore, the total adds up to more than 100%.

PARTICIPATION IN ENERGY TRUST PROGRAMS

We also compared the reported awareness of and participation in Energy Trust programs for four groups, based on their potential for different services (space heating, appliance, and lighting upgrades). There are four groups of respondents who meet the basic requirements for participation in Energy Trust programs, based on their electric and natural gas utilities, as well as their energy source for space heating (Table 3.2).

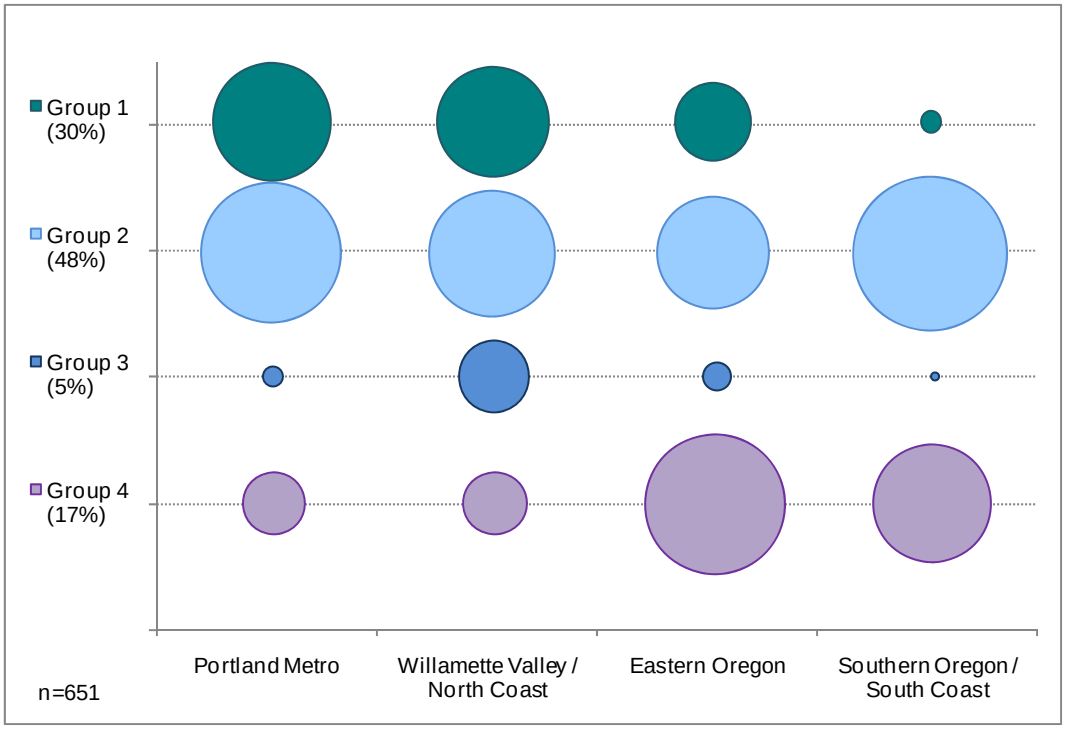
Table 3.2: Groups Eligible for Energy Trust Offers Available

CHARACTERISTIC	GROUP 1	GROUP 2	GROUP 3	GROUP 4
Energy Source for Space Heating	Natural Gas	Electricity	Natural Gas	Other Sources or Natural Gas from Avista
Electric Utility	PGE or PacifiCorp	PGE or PacifiCorp	Not PGE or PacifiCorp	PGE or PacifiCorp
Natural Gas Utility	NW Natural or Cascade Natural	NA	NW Natural or Cascade Natural	NA
Energy Trust Offers Available	2	2	1	1

Group 1 and Group 2 are eligible for Energy Trust's rebate programs to upgrade space heating equipment and appliances (two offers are available for ENERGY STAR® space heating system upgrades or appliance rebates.). Group 3 is eligible for space heating equipment upgrades, but not for appliances because their electric utilities are not served by Energy Trust. Group 4 is eligible for appliance upgrades, but not space heating equipment. Overall, two Energy Trust offerings are available to Groups 1 and 2, and only one offering is available to Groups 3 and 4.

Figure 3.17 illustrates the proportion of each group by the four geographic regions. Group 1 is primarily located in the Portland Metropolitan and Willamette/North Coast, Group 2 is spread all across the state, Group 3 is mainly in the Willamette/North Coast, and Group 4 is primarily in Eastern Oregon and Southern Oregon/Southern Coast areas. The figure also shows the relative size of each group – Group 2 has the largest number of respondents (48%), group 1 has the second largest number of respondents (30%), and so on.

Figure 3.17: Proportion of Offer Groups within Regions



When the level of awareness is analyzed by offer group, we observed that Group 1 is significantly more aware of Energy Trust compared with the other groups ($p<.05$; Figure 3.18). Fifty-nine percent of Group 1 respondents were aware of Energy Trust, while awareness of Energy Trust by the other groups' respondents ranged from 34% to 39%. Comparing awareness of Energy Trust with corresponding respondents in 2008, respondents of all Groups demonstrated substantially increased awareness in 2009.

Figure 3.18: Awareness of Energy Trust Program by Offer Group

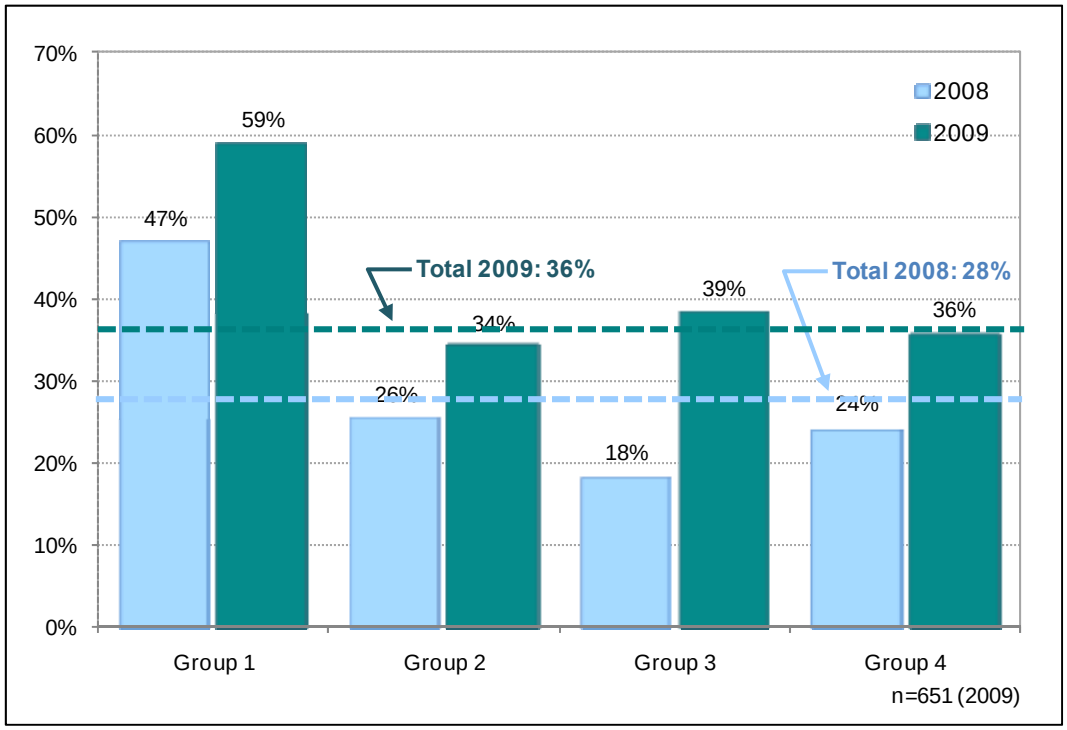
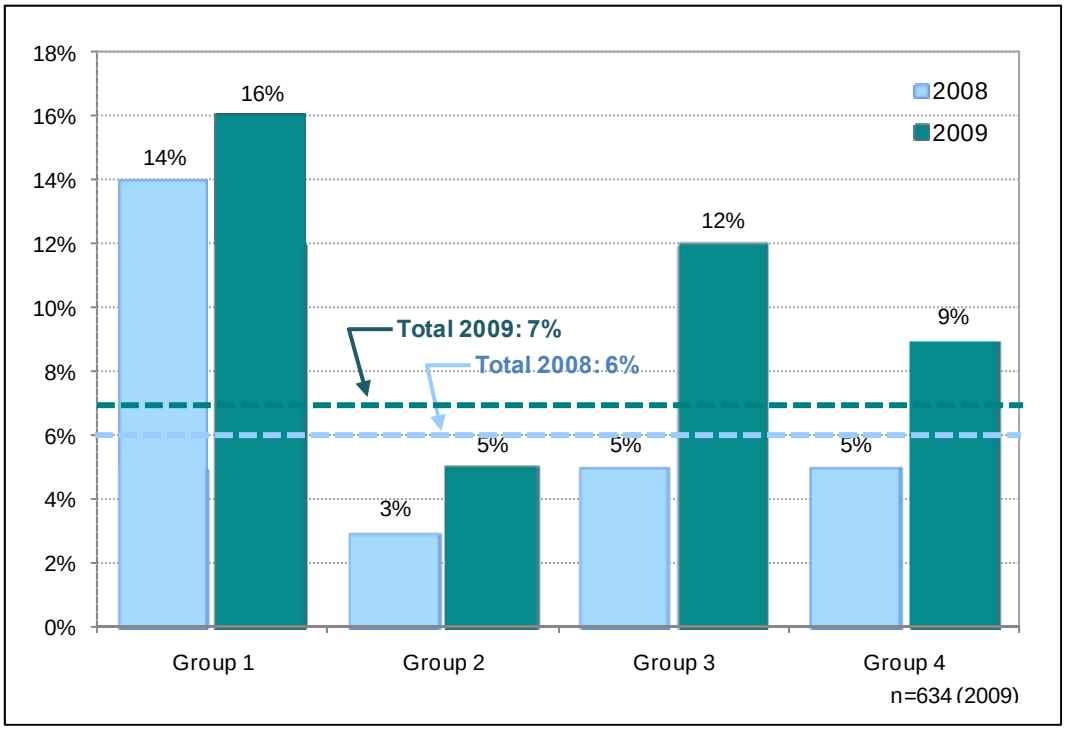


Figure 3.19 shows the rate of participation in Energy Trust programs by each offer group in 2008 and 2009. Much higher rates of participation were reported by Group 1 and Group 3 respondents (16% and 12% respectively); both groups' primary energy source for space heating is natural gas. Group 4 respondents reported a slightly higher than average rate of participation (9%) and Group 2 respondents reported the lowest rate of participation (5%); both of these groups use electricity for space heating. As shown earlier in Figure 3.15, space heating fuel type appears to be highly correlated with participation in Energy Trust programs.

Though the number of Energy Trust offerings available to Groups 1 and 2 are the same and Groups 3 and 4 receive only one offering, Group 2 respondents are far less likely to take advantage of Energy Trust programs compared with other groups ($p<.05$). Also, this group constitutes the largest number of respondents among all the groups that are qualified for Energy Trust services (48%).

Figure 3.19: Participation in Energy Trust Programs by Offer Group



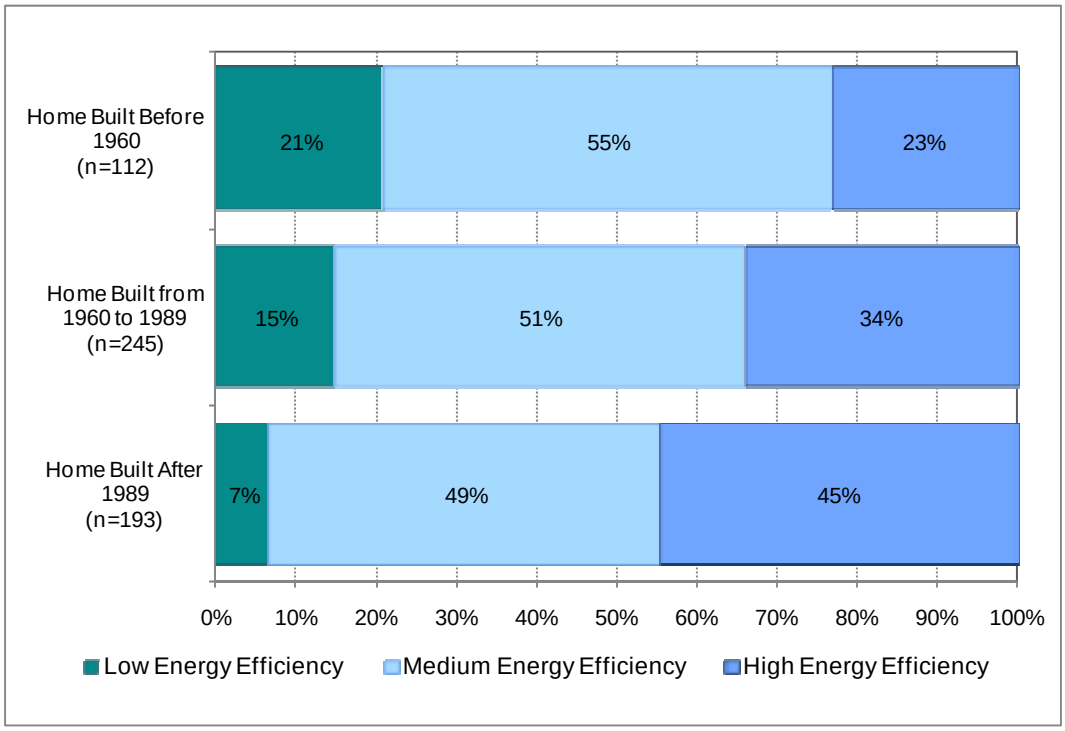
SELF-ASSESSMENT OF HOME ENERGY EFFICIENCY

Next, we attempted to determine how household members made decisions that affected their home's energy efficiency. First, we asked respondents to describe their home's energy efficiency using a zero-to-ten-point scale, where zero was "the least energy-efficient home" and ten was "the most energy-efficient home." We limited our analysis of the responses to homeowners, because we thought renters might not have comprehensive knowledge of their building's features that affect energy consumption.

The result indicates that homeowners seemed to estimate their home's overall energy efficiency at a mean of 6.19 – a moderately conservative level. We did not observe any statistically significant differences between participants and nonparticipants, regions, type of home, fuel types for heating, income, and intention to participate in Energy Trust programs in the future.

The only difference we observed was the age of the home ($p<.05$). The respondents who lived in older homes rated their home's energy efficiency significantly lower than the respondents who lived in newer homes. For Figure 3.20, self-assessed low (a rating of 0 to 4), medium (a rating of 5 to 7), and high (a rating of 8 to 10) ratings of home energy efficiency are based on the zero-to-ten-point scale described above.

Figure 3.20: Owners' Self-Assessment of Home Energy Efficiency by Age of Home

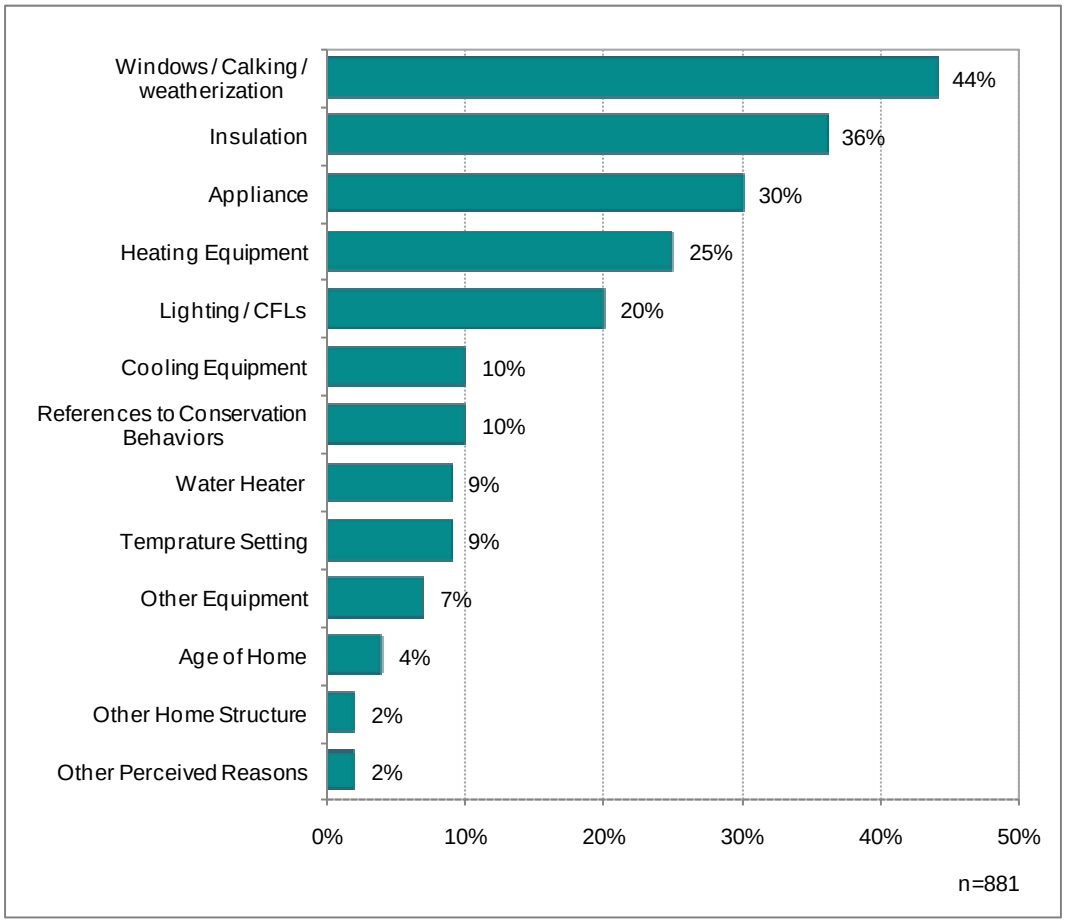


We then asked homeowners a question about which specific element or equipment in their home led to their self-assessed energy efficiency rating. The question was in an open-ended format with several pre-coded categories. We later recoded "other" responses (Figure 3.21).

Respondents said that the most common elements that contributed to their estimation of their home's energy efficiency level were the condition of the windows (44%) or insulation (36%) – factors that relate to home weatherizing. Types and ages of appliances (30%), heating equipment (25%), and lighting controls and bulbs (20%) also were cited frequently. Other factors were air-conditioning equipment (10%), a water heater (9%), thermostat settings (9%), age of the home (4%), and other types of equipment and home structures (7% and 2%, respectively). Ten percent of the respondents reported a variety of behaviors, most of which related to their attempts to save energy.

We compared responses to this question by respondents who rated their home's energy efficiency high (8 points or higher) or low (3 points or lower). Both groups mentioned weatherization factors at similar frequencies. However, the high rating group mentioned appliances (40%), lighting (25%), and air-conditioning equipment (17%) much more frequently than did the low group (29%, 11%, and 3% respectively).

Figure 3.21: Factors Contributing to Homeowners' Energy Efficiency Self-Assessment



Note: The percentages shown represent all of the factors identified by each respondent. Some respondents named more than one factor; therefore, the total adds up to more than 100%.

ATTITUDES, PERCEPTIONS, AND BELIEFS

One emphasis of this year's survey was an investigation of respondents' in-depth attitudes, perceptions, and beliefs about common issues related to energy efficiency and renewable energy. We randomly read a series of statements that described opinions or actions related to how people use energy and asked respondents to rate each of the statements using a zero-to-ten-point scale, where zero was "strongly disagree" and ten was "strongly agree."[6]

[6] "Don't know" or "refusal" responses were treated as missing data. "No opinion" responses were re-coded to the middle-point ("5").

We organized responses to a total of 22 statements into six different categories:[7]

- Energy Concerns
- Pro-Saving Energy Attitudes
- Anti-Saving Energy Attitudes
- Perceived Efficacy of Energy Efficiency Actions for Mitigating Environmental Impacts
- Trusted Information Source
- Knowledge

Overall, the respondents reported moderate levels of concern about general energy issues (mean range: 4.73 to 7.54). Pro-saving energy attitudes were rated high (mean range: 6.93 to 9.03), while anti-saving energy attitudes were rated lower (mean range: 2.58 to 6.12). Moreover, many respondents rated energy efficiency actions for mitigating environmental impacts as moderately higher priorities (mean range: 4.29 to 8.85). These responses suggest that respondents generally were concerned about energy issues and were moderately ready to take efficiency actions.

The responses also suggest that respondents positively perceived energy efficiency information provided by Oregon's key organizations (mean range: 5.84 to 7.46). Several items intended to measure respondents' knowledge and understanding of issues that relate to energy efficiency indicate that respondents are reasonably informed about the energy efficiency market from a consumer's point-of-view, such as the general efficiency of appliances or availability of efficient products (mean range: 4.75 to 7.68).

We conducted nonparametric statistical tests[8] to compare responses given by participants and nonparticipants; any significant differences are noted with a symbol (*) in Table 3.3 and Table 3.4. In Table 3.3, results regarding homeowner responses are shown, whereas in Table 3.4 non-participant differences between renters and homeowners are shown.

Five of the items were rated significantly differently by participants and nonparticipants ($p<.05$). More participants than nonparticipants said the following energy-saving activities were higher-priority actions that might mitigate environmental impacts: changing thermostat settings; replacing appliances with more efficient models; installing insulation or upgrading windows; and driving less. Participants also were significantly more likely to describe high energy use as a cause of global climate change.

---

7 These categories were constructed using factor analysis that was originally intended for the segmentation analysis (discussed in Chapter 4). For the purpose of question-by-question analysis, all variables are presented here regardless the factor-loading scores.

8 Significance determined by using the Mann-Whitney U, a non-parametric test that analyzes ordinal variables comparing two groups.

Table 3.3: Attitudes, Perceptions, and Beliefs – Homeowner Responses

ITEMS	MEAN SCORES			SIG. (P)[1]
	TOTAL	PARTICIPANT	NON-PARTICIPANT	
ENERGY CONCERNS				
Energy efficiency and conservation are frequent topics of conversation with my friends and family.	4.73	5.06	4.69	NS
Global warming is a result of high energy use.	5.72	6.63	5.61	*
We are using up our energy supplies too fast.	7.09	7.34	7.06	NS
People should try to use less energy to reduce the need to build new power plants.	7.54	7.68	7.53	NS
PRO-SAVING ENERGY ATTITUDES				
I am planning to take some measures to use less energy at home this year.	6.93	7.03	6.92	NS
I worry that the cost of energy for my home will increase.	7.65	7.54	7.67	NS
It is important to save energy in my home.	8.84	8.76	8.85	NS
Saving energy in my home helps me save money.	9.03	8.82	9.05	NS
ANTI-SAVING ENERGY ATTITUDES				
I'm too busy to be concerned about saving energy in my home.	2.58	2.44	2.60	NS
Conserving energy at my home will make no difference to the quality of the environment overall.	3.47	3.37	3.48	NS
There is very little I can do to save money on my energy bill.	3.67	3.24	3.72	NS
I would like to do more to make my home more energy-efficient, but I don't know where to start.	4.39	3.90	4.45	NS
Comfort is very important to my household, even if it means spending more each month for energy.	6.12	5.59	6.19	NS
PERCEIVED EFFICACY OF ENERGY-EFFICIENT AND RECYCLING ACTIONS[2]				
Driving an electric or hybrid gas-electric vehicle	4.29	4.55	4.25	NS
Walking, biking, or using mass transit instead of driving	4.42	5.53	4.29	*
Installing additional or upgraded insulation or windows	5.52	6.98	5.34	**
Replacing major appliances with more energy-efficient ones	6.72	8.21	6.54	***
Setting heating or cooling temperature with programmable thermostat to use less energy	7.05	8.28	6.91	**
Replacing regular light bulbs and fixtures with energy-efficient ones	7.32	7.53	7.30	NS
Recycling paper, cans, bottles and plastics	8.85	9.02	8.83	NS

Continued

ITEMS	MEAN SCORES			SIG. (P)[1]
	TOTAL	PARTICIPANT	NON-PARTICIPANT	
TRUSTED INFORMATION SOURCE				
Specialty contractors provide good information about saving energy.	5.84	6.06	5.81	NS
The Oregon Department of Energy provides good information about saving energy.	6.66	6.95	6.62	NS
My gas utility provides good information about saving energy.	6.95	6.61	7.02	NS
Energy Trust of Oregon provides good information about saving energy.	7.18	7.44	7.08	NS
My electric utility provides good information about saving energy.	7.46	7.02	7.51	NS
KNOWLEDGE				
All of the appliances on the market today are energy-efficient.	4.75	4.56	4.78	NS
I am interested in knowing how energy use in my home compares with other similar homes in the area.	4.84	5.00	4.83	NS
Heating, cooling, and lighting are more significant sources of energy use than electronics in most homes.	7.05	6.92	7.07	NS
Energy-efficient products and services are readily available.	7.68	8.13	7.63	NS

[1] Asterisks denote significant differences between participants and nonparticipants. Levels of significance: *= p<..05; **=p<.001, and ***=p<.0001.

[2] Items of effective actions for energy efficiency were rated using a zero-to-ten-point scale, where zero was "very low priority" and ten was "very high priority."

Table 3.4: Attitudes, Perceptions, and Beliefs – Nonparticipants Responses

ITEMS	MEAN SCORES			SIG. (P)[1]
	TOTAL	OWNER	RENTER	
ENERGY CONCERNS				
Energy efficiency and conservation are frequent topics of conversation with my friends and family.	4.57	4.69	4.26	*
Global warming is a result of high energy use.	5.92	5.61	6.30	**
We are using up our energy supplies too fast.	7.27	7.06	7.63	*
People should try to use less energy to reduce the need to build new power plants.	7.68	7.53	7.94	**

Continued

ITEMS	MEAN SCORES			SIG. (P)[1]
	TOTAL	OWNER	RENTER	
PRO-SAVING ENERGY ATTITUDES				
I am planning to take some measures to use less energy at home this year.	7.10	6.92	7.42	NS
I worry that the cost of energy for my home will increase.	7.67	7.67	7.71	NS
It is important to save energy in my home.	8.84	8.85	8.84	NS
Saving energy in my home helps me save money.	8.98	9.05	8.88	NS
ANTI-SAVING ENERGY ATTITUDES				
I'm too busy to be concerned about saving energy in my home.	2.59	2.60	2.62	NS
Conserving energy at my home will make no difference to the quality of the environment overall.	3.34	3.48	3.09	NS
There is very little I can do to save money on my energy bill.	3.76	3.72	3.94	NS
I would like to do more to make my home more energy-efficient, but I don't know where to start.	4.85	4.45	5.75	***
Comfort is very important to my household, even if it means spending more each month for energy.	6.03	6.19	5.85	*
PERCEIVED EFFICACY OF ENERGY-EFFICIENT AND RECYCLING ACTIONS[2]				
Driving an electric or hybrid gas-electric vehicle	4.39	4.25	4.59	NS
Walking, biking, or using mass transit instead of driving	5.07	4.29	6.32	***
Installing additional or upgraded insulation or windows	5.58	5.34	5.70	NS
Replacing major appliances with more energy-efficient ones	6.52	6.54	6.12	NS
Setting heating or cooling temperature with programmable thermostat to use less energy	6.96	6.91	6.78	NS
Replacing regular light bulbs and fixtures with energy-efficient ones	7.42	7.30	7.62	NS
Recycling paper, cans, bottles and plastics	8.89	8.83	8.99	NS
TRUSTED INFORMATION SOURCE				
Specialty contractors provide good information about saving energy.	5.82	5.81	5.78	NS
The Oregon Department of Energy provides good information about saving energy.	6.57	6.62	6.40	NS
My gas utility provides good information about saving energy.	6.67	7.02	5.75	NS
Energy Trust of Oregon provides good information about saving energy.	7.05	7.08	6.64	NS
My electric utility provides good information about saving energy.	7.29	7.51	6.96	*

Continued

ITEMS	MEAN SCORES			SIG. (P)[1]
	TOTAL	OWNER	RENTER	
KNOWLEDGE				
All of the appliances on the market today are energy-efficient.	4.84	4.78	5.02	NS
I am interested in knowing how energy use in my home compares with other similar homes in the area.	5.13	4.83	5.70	**
Heating, cooling, and lighting are more significant sources of energy use than electronics in most homes.	7.12	7.07	7.27	NS
Energy-efficient products and services are readily available.	7.45	7.63	7.01	*

[1] Asterisks denote significant differences between participants and nonparticipants. Levels of significance: *= p<..05; **=p<.001, and ***=p<.0001.

[2] Items of effective actions for energy efficiency were rated using a zero-to-ten-point scale, where zero was "very low priority" and ten was "very high priority."

These findings may indicate that participants and nonparticipants indeed have different attitudes and perceptions, particularly about specific behaviors that could result in energy savings and more responsible use of energy.

Among nonparticipants, renters seemed to be significantly more concerned about general energy issues, such as global warming, energy use in the U.S., and construction of new power plants. However, homeowners were significantly more likely to have conversations about energy efficiency with their family or friends. This difference may be related to the fact that renters often cannot do much to improve the energy efficiency of their homes, since they do not own their residence; thus, they can be less likely to discuss energy-efficiency. In fact, renters were more likely to agree with the following statement: "I would like to make my home more energy-efficient but I do not know where to start." This finding was not surprising, since renters were significantly less likely to believe that energy-efficient products were readily available and that their utility provided good information about saving energy.

We also observed that renters among the non-participants were significantly less likely in comparison to homeowners to say that they are willing to increase comfort by paying more for energy. This finding suggests that cost of energy is important to renters. From the segmentation analysis (discussed in the *Segmentation* section of this report), renters are generally in lower income categories, which could explain their responses.

Lastly, renters were more interested than homeowners in knowing how their home compares to others in regards to energy consumption. All these significant findings are noted in Table 3.4.

HOME FEATURES AND ENERGY USE BEHAVIOR

We asked all respondents a series of questions about home features and behaviors that affect energy use. Table 3.5, Table 3.6, and Table 3.7 summarize the responses, with comparisons between participants and nonparticipants, and provide results of a statistical test of significance.

CFLs

First, we asked respondents if any compact fluorescent lamps (CFLs) or twisty-swirly bulbs had been installed in their home. Eighty-five percent of the respondents reported their homes had at least one CFL installed (Table 3.5). This suggests that the penetration of CFLs in residential homes had increased by 6% from 2008. Among participants, the penetration rate increased by 3%, while it increased 7% among nonparticipants. According to our findings, in 2009, the difference in CFL penetration between participants and nonparticipants is not significant.

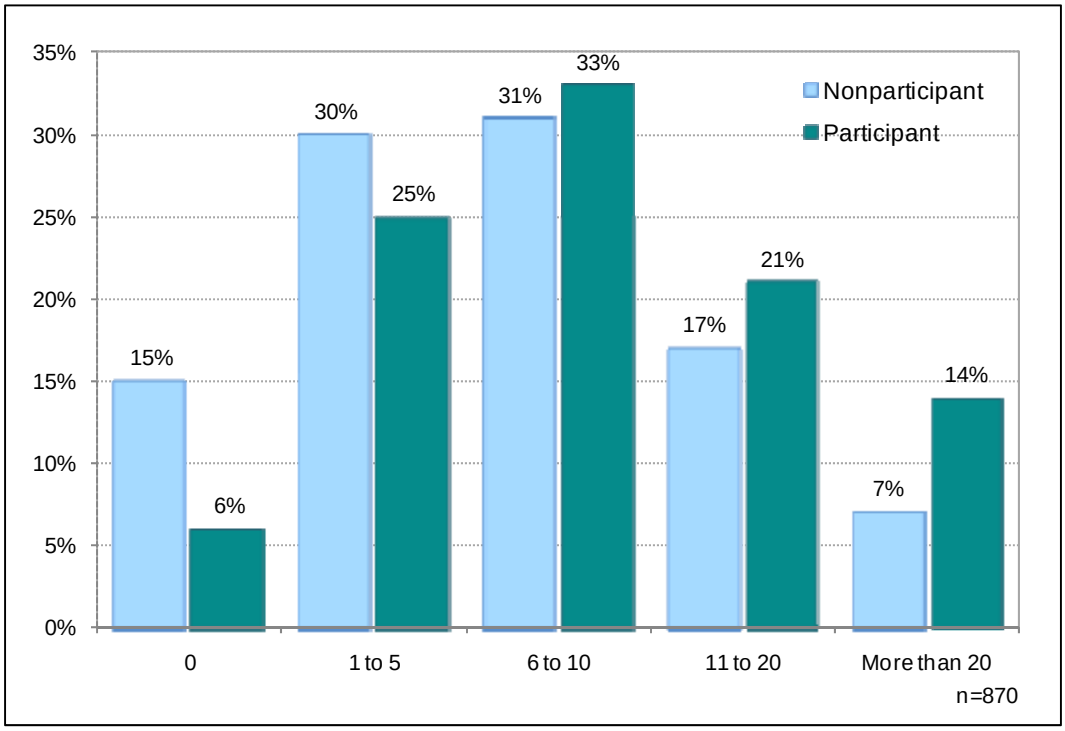
Table 3.5: Use of Compact Fluorescent Lamps (CFLs)

USE	TOTAL	PARTICIPANTS	NON-PARTICIPANTS	SIG. (P)[1]
Have CFL (Yes)	85%	94%	86%	NS
CFL Penetration in 2008	79%	91%	79%	*

[1] Asterisks denote significant differences between participants and nonparticipants. Levels of significance: *= p<..05; **=p<.001, and ***=p<.0001.

We asked respondents a follow-up question: to estimate the number of CFLs installed in their home. Although participants' homes seemed to have slightly more CFLs installed than nonparticipants' homes, as Figure 3.22 shows, the difference was not statistically significant.

Figure 3.22: Number of CFLs Installed



Thermostats

Next, we asked respondents about their use of thermostats (Table 3.6). Though most (85%) of the respondents reported that their homes had one or more thermostats that controlled heating and/or cooling, only 40% of all the respondents said they had a programmable thermostat that allowed them to set different temperatures for specific time periods. Moreover, a significantly higher percentage of participants reported using programmable thermostats (60%) than did nonparticipants (40%; $p<.05$).

We then asked the respondents whose homes had a programmable thermostat if they regularly used the thermostats' automatic features to control indoor temperature. Sixty-six percent reported that they used the automatic features. This suggests that indoor temperatures in only 30% of the homes that had some type of thermostat were being controlled by automated features.

Table 3.6: Use of Thermostats

USE	TOTAL	PARTICIPANTS	NON-PARTICIPANTS	SIG. (P)[1]
Have Programmable Thermostat	40%	60%	40%	**
Use Automatic Feature of the Thermostat Regularly (Yes)	66%	73%	66%	NS

[1] Asterisks denote significant differences between participants and nonparticipants. Levels of significance: *= p<..05; **=p<.001, and ***=p<.0001.

Air Conditioning

We also examined the use of air conditioning (Table 3.7). A total of 55% of the respondents reported that their homes had air-conditioning systems; 36% of these homes had window or room air-conditioning units. We found that nonparticipants were significantly more likely to use window or room units (37%) than participants (18%; $p<.05$).

When we compared owner- and renter-occupied homes, we found that owners were more likely to have an air-conditioning system (62%) than renters (41%; $p<.05$). In addition, a majority of rental homes that had air conditioning used window or room units (71%). Use of window or room units was significantly smaller in owner-occupied homes (23%; $p<.05$).

Table 3.7: Use of Air Conditioners

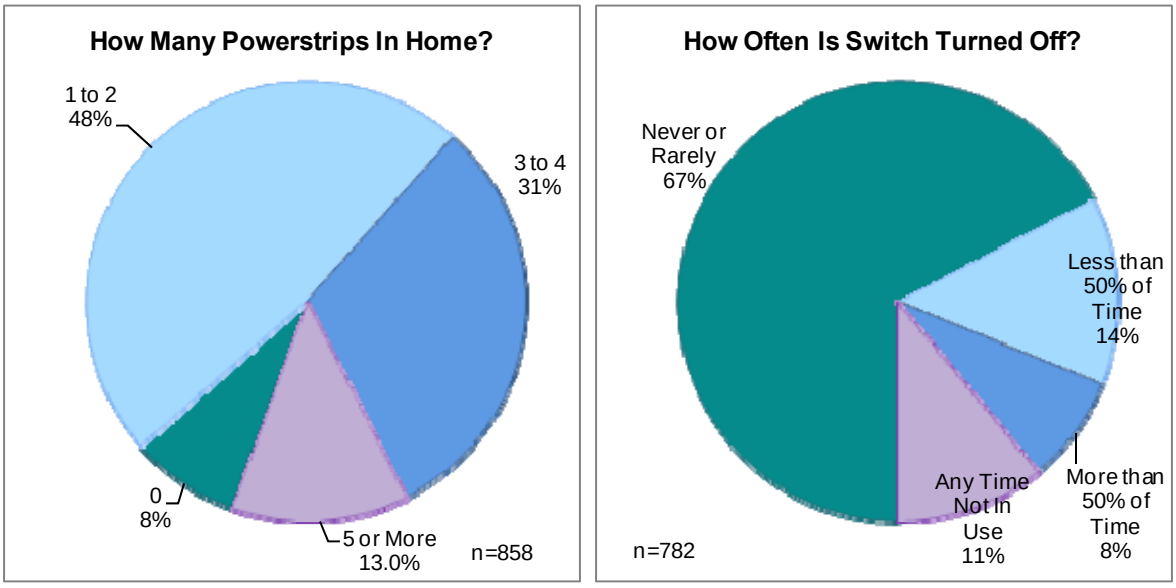
USE	TOTAL	PARTICIPANTS	NON-PARTICIPANTS	SIG. (P)[1]
Have Air-Conditioning System (Yes)	55%	67%	54%	NS
Type: Window Or Room Air-Conditioner Unit	36%	18%	37%	*

[1] Asterisks denote significant differences between participants and nonparticipants. Levels of significance: *= p<..05; **=p<.001, and ***=p<.0001.

Power Strips

The use of small electronic devices is one of the fastest-growing sources of rising residential electric consumption in recent years. To gauge the impacts of these devices, the 2009 survey included a few questions to assess the use of power strips. These strips allow people to plug in multiple electronic devices simultaneously. Figure 3.23 shows overall frequencies of the responses to these questions.

Figure 3.23: Use of Power Strips



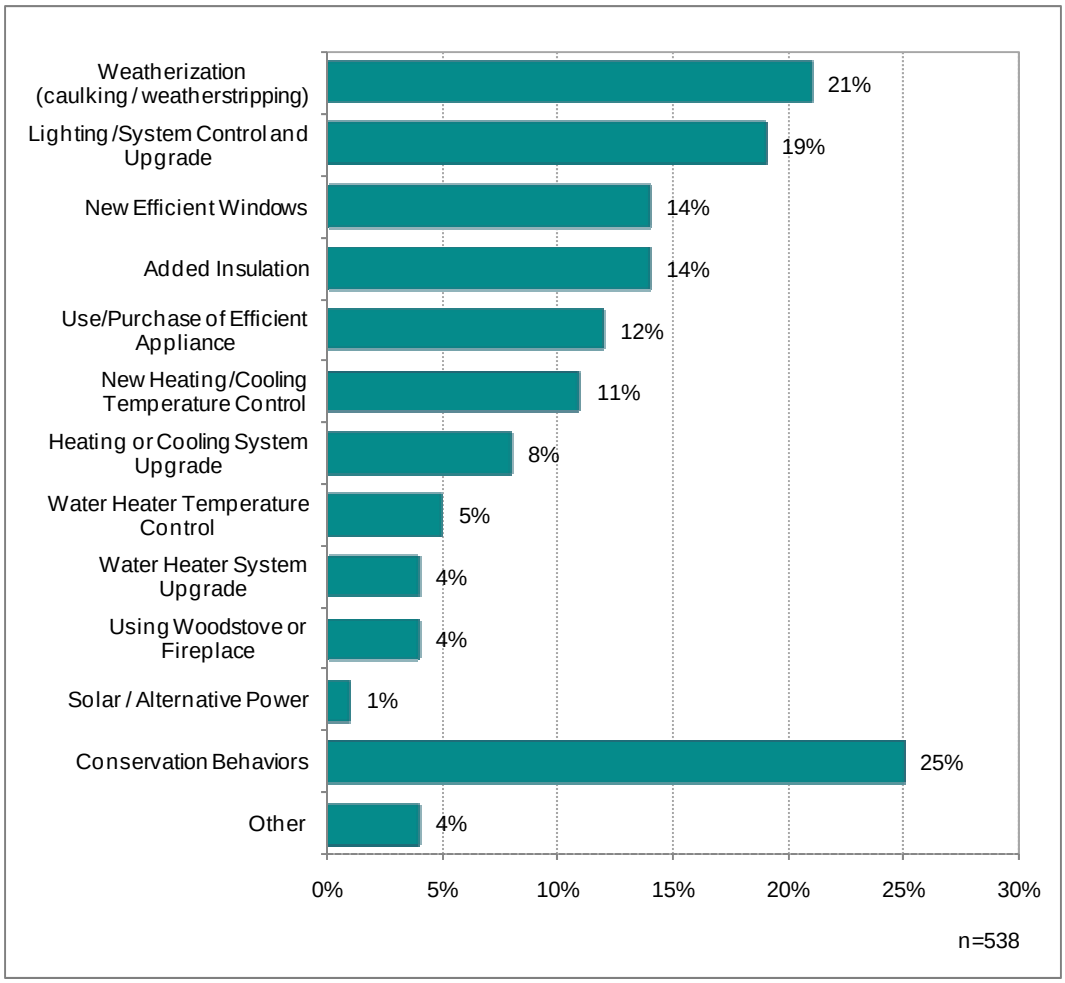
A majority of the respondents (92%) reported that they use at least one power strip in their home. Furthermore, a considerable number of respondents (44%) reported that they use three or more strips in their homes. There were no statistical differences in the reported number of power strips between participants and nonparticipants, or between respondents who were owner-occupants or renters.

We asked the respondents who used at least one power strip in their home about how frequently they turned off the main switch of any power strip in order to shut down all of the devices that were plugged into the strip. A majority (68%) of these respondents said they never or rarely turned off the main switch, and only 11% said they turned them off whenever none of the plugged-in devices were in use. When we compared this conservation behavior between participants and nonparticipants, we found that a significantly higher proportion of participants reported that they turned off their power strips more frequently. Put another way, we found that 58% of participants and 69% nonparticipants said they never or rarely turned off the main switches.

Other Energy Saving Actions

Finally, we gave respondents an opportunity to report any other actions they had taken in the last 12 months to reduce their home's energy use. We asked an open-ended question with several pre-coded categories. We recoded "other" responses later. Sixty percent of the respondents reported taking at least one action (Figure 3.24).

Figure 3.24: Other Activities to Reduce Energy Usage



Note: The percentages shown represent all of the factors identified by each respondent. Some respondents named more than one factor; therefore, the total adds up to more than 100%.

The most common responses (25% of the total) concerned conservation behaviors. The most frequently reported conservation actions were: turning off lights; unplugging devices when not in use; air-drying clothes; increasing or decreasing natural lights, depending on seasons; and wearing extra layers of clothing, etc.

The most commonly reported efficiency measures were home weatherization (21%) and lighting control and/or system upgrades (19%). Other common responses were: installing efficient windows (14%), adding insulation (14%), using efficient appliances (12%), and controlling the temperature with a thermostat (11%). Eight percent of the respondents who took some action reported they upgraded their heating and/or cooling system in the last 12 months. Four to five percent of respondents reported changing their water heater's temperature setting and upgrading the water-heating system. Some respondents (4%) mentioned that they tried to save energy by heating their homes with a woodstove or fireplace.

ENERGY STAR®

For the 2008 study, we asked respondents if they were aware of the ENERGY STAR® label, which is used to identify appliances that meet U.S. Environmental Protection Agency (EPA) energy efficiency standards (Table 3.8). In 2009, 61% of all respondents reported they had heard of ENERGY STAR® – a 5% increase since the 2008 study. Awareness of the ENERGY STAR® label was not significantly different between owners and renters, but participants (83%) reported a significantly higher awareness of ENERGY STAR® than nonparticipants (60%; $p<.05$).

When asked about how frequently the ENERGY STAR® label factored into decisions about buying appliances, a high proportion (80%) of those who said they were aware of the label reported they "always" or "most of the time" considered ENERGY STAR®-labeled models. Participants (94%) and owner-occupant households (86%) reported that they considered ENERGY STAR® models significantly more frequently than did nonparticipants (81%) and renters (73%), respectively.

Table 3.8: ENERGY STAR® Awareness and Purchase Decision

USE	TOTAL	PARTICIPANTS	NON-PARTICIPANTS	SIG. (P)[1]
Heard of ENERGY STAR® (Yes)	61%	83%	60%	***
Awareness of ENERGY STAR® in 2008	56%	80%	55%	***
Consider ENERGY STAR® Models Always or Most of the Time	80%	94%	81%	*

[1] Asterisks denote significant differences between participants and nonparticipants. Levels of significance: *= p<..05; **=p<.001, and ***=p<.0001.

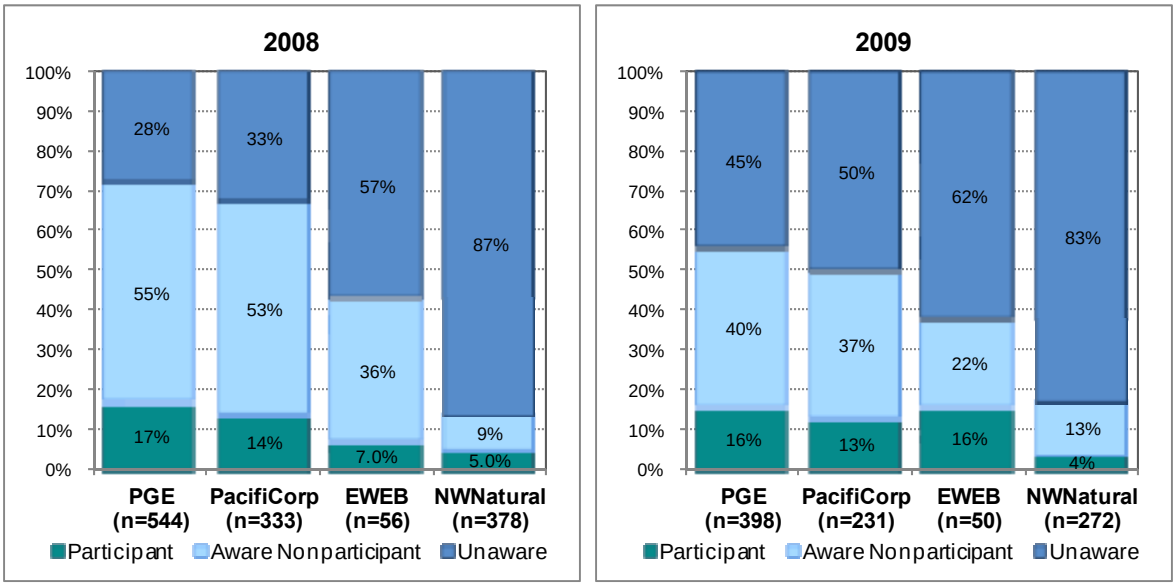
RENEWABLE ENERGY

Most of the major electric or gas utilities in Oregon offer green power option programs, which allow their customers to purchase electricity or natural gas from renewable energy sources at a

marginally higher rate than their basic monthly service charge.[9] We asked respondents a series of questions to assess their awareness of and participation in these programs.

Figure 3.25 illustrates: the rates of those who reported that they participated in these renewable option programs; those who were aware of the programs, but did not participate in one of them; and those who were unaware of the programs. The figure also compares the results from the 2008 and 2009 studies.

Figure 3.25: Renewable Energy Program Awareness and Participation



The participation rate in EWEB's Greenpower program appears to have increased notably (+9 percentage points). Participation in other utilities' renewable energy programs changed little between 2008 and 2009; it ranged from 13% to 16% for the other electric utilities and 4% for NW Natural.[10]

The data show that, for most of the electric utilities, the percentage of respondents who were unaware of their utility's renewable option programs increased substantially. In addition, the percentage of respondents who were aware of the programs, but did not participate, went down

---

9 PGE offers the *Green Source*™ program, Pacific Power offers the *Blue Sky* program, and EWEB offers its *EWEB Greenpower* program. Under these programs, customers volunteer to pay an additional $0.0078 to $0.01 per kWh over the basic service rate on their monthly bill. The electric utility uses the funds to buy electricity from renewable sources, such as wind and biomass. NW Natural offers the *Smart Energy*™ program, which allows customers, for an additional $6.00 per month (as well as a pay-per-therm option), to support environmental projects that prevent the release of greenhouse gases.

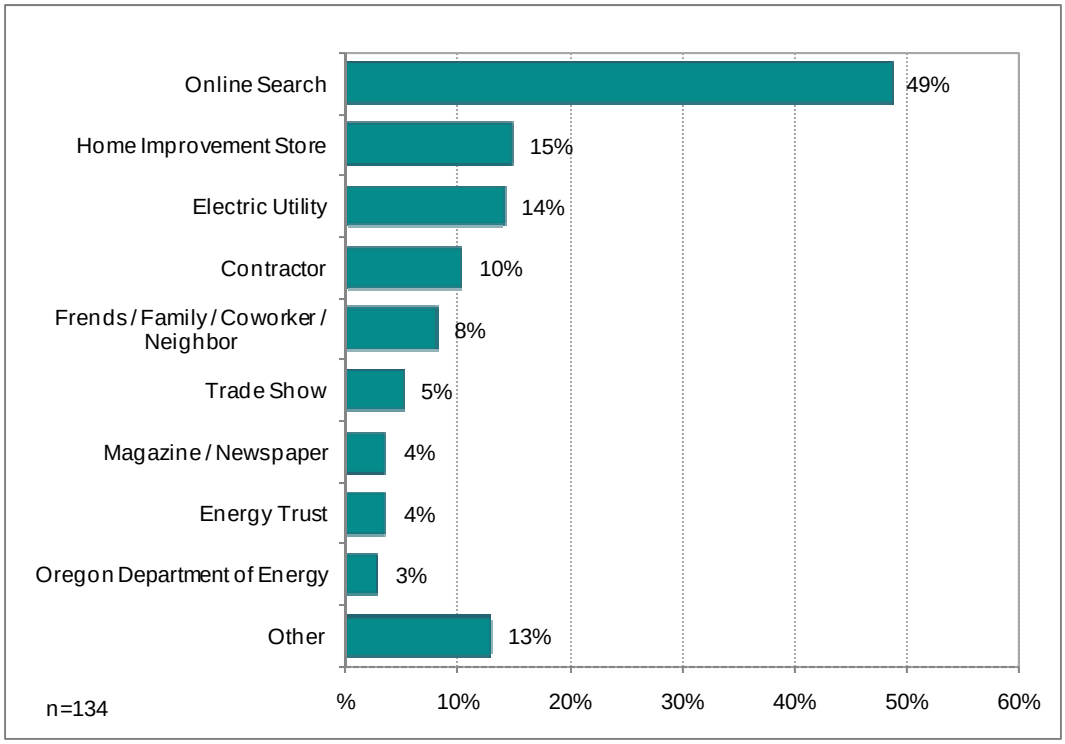
10 The self-reported rates for PGE and Pacific Power are much higher than what the utilities report (6.2% to 9.7%). See *http://apps3.eere.energy.gov/greenpower/markets/pricing.shtml?page=3.*

for all but NW Natural. These changes exceed the margin of error. The economic downturn that occurred in late 2008 and 2009 may have affected participation, since renewable option programs increase customers' bills. Another possible explanation is that the utilities altered the types or levels of their marketing activities. These differences also may just reflect different populations.

When we asked respondents if they had looked for information on renewable energy applications for their home in the last year, 20% of them reported they had. We did not find that these respondents had particular demographic characteristics, although we did find that participants in the utilities' renewable energy option programs were significantly more likely to report that they had investigated renewable energy for their homes (53% of participants and 18% nonparticipants in the renewable option programs; $p<.05$).

Figure 3.26 shows the sources respondents use for renewable energy information. Overwhelmingly, respondents said they relied most on the Internet for this information (49%). By contrast, 15% of respondents reported they had inquired at home improvement stores (i.e., Home Depot), their electric utility (14%), their contractor (10%), or through people they know (8%). Other respondents sought information through trade shows (5%), magazines and newspapers (4%), Energy Trust (4%), or the Oregon Department of Energy (3%).

Figure 3.26: Where to Look for Renewable Energy Information



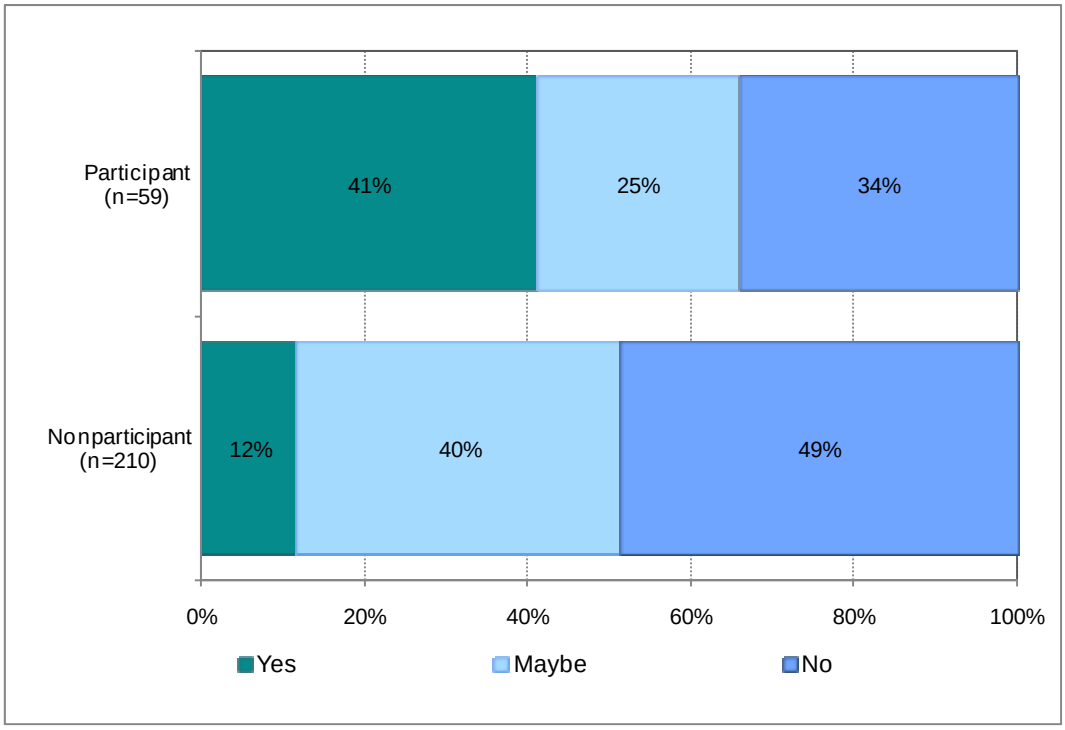
Note: The percentages shown represent all factors identified by each respondent. Some respondents named more than one factor; therefore, the total adds up to more than 100%.

INTENTION TO PARTICIPATE IN THE FUTURE

We asked all of the respondents if they thought they would participate in Energy Trust programs in the subsequent 12 months. In the 2009 survey, the question was improved by capturing "maybe" responses; therefore, a comparison with the 2008 results is not relevant.

As Figure 3.27 shows, participants and nonparticipants reported significantly different responses ($p<.05$). A much greater proportion of participants (41%) than nonparticipants (12%) indicated they were considering participating in the programs in the next 12 months.

Figure 3.27: Intention to Participate in Future Energy Trust Programs



Note: "Don't know" responses were treated as missing.

4 SEGMENTATION

In this chapter, we analyze energy consumption behavior and notable findings using multivariate analyses, and present findings from the segmentation analysis to identify distinct market segments for Energy Trust program marketing.

ENERGY CONSUMPTION DATA

In this section, we discuss the procedures and findings of the energy consumption data analysis.

Method

Energy Trust provided monthly energy consumption data for the period between March 2008 and March 2009. Energy usage data were available only for PGE, Pacific Power, NW Natural, and Cascade Natural Gas residential customers.

Of the 904 households that completed interviews, Energy Trust matched 333 addresses with PGE, Pacific Power, NW Natural, or Cascade Natural Gas billing data. Of those, 141 households were matched with electric utility billing data, 41 with natural gas billing data, and 151 with both the natural gas and electricity billing data (Table 4.1). We had complete billing data for 252 cases. The percent of the sample with complete billing data was fairly low (28%); however, it was similar to the percent in 2008.

Table 4.1: Sample Size of Energy Consumption Data

CHARACTERISTIC	SAMPLE SIZE 2008	PERCENT OF TOTAL SAMPLE POPULATION 2008	SAMPLE SIZE 2009	PERCENT OF TOTAL SAMPLE POPULATION 2009
Sample Population	1,205	100%	904	100%
Households with Electric/Gas Billing Data	614	51%	333	37%
• **Natural Gas Data Only**	48	—	41	—
• **Electric Data Only**	309	—	141	—
• **Both Natural Gas and Electric Data**	257	—	151	—
Households With Complete Billing Data	356	30%	252	28%

Of the 333 matched cases in 2009, 81 cases had incomplete billing data. Specifically, we excluded 41 households for whom we had only natural gas billing records. We also excluded 40 households with only electricity billing records, as we knew the households used natural gas for

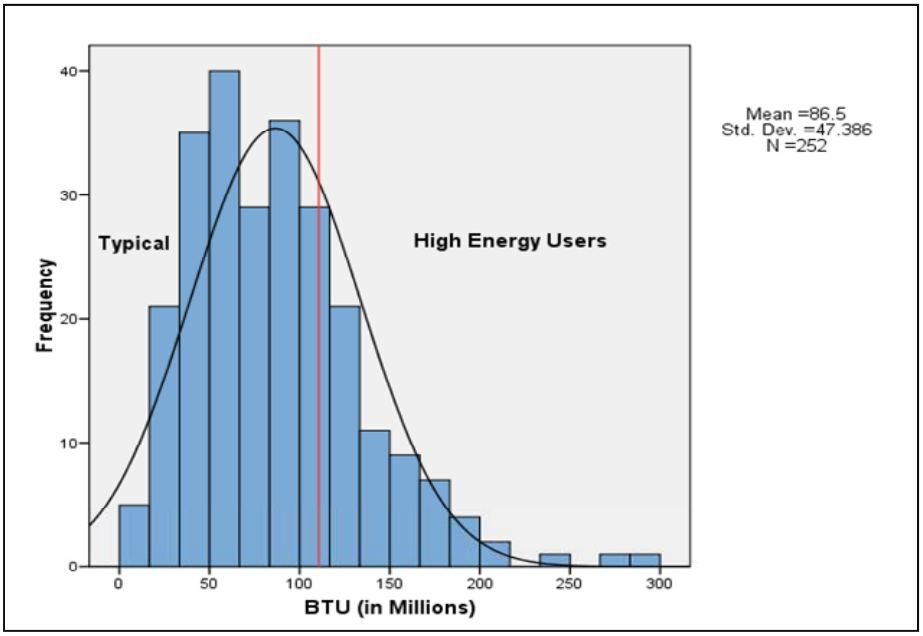
heating. We did not exclude any households with only electricity billing data that used electricity for heating; because it was assumed that such households were "electric only," their electric billing records reflected their total energy consumption.

Energy Trust normalized the electricity and gas consumption data for weather. Their team conducted a series of regressions of average daily energy use on average daily heating-degree-days (HDD) and cooling-degree-days (CDD) for the March 2008 to March 2009 billing period. Specifically, Energy Trust examined every combination of HDD and CDD in relation to average daily energy use – from reference temperatures ranging from 34° to 72° F for HDD and 66° to 84° F for CDD. The model with the highest R-square for the household was chosen. Based on the chosen model, the annual energy consumption was computed by multiplying the weather adjusted daily energy use times 365 days. To determine each household's total energy consumption in BTU units, Research Into Action combined the annual electric and natural gas weather-normalized consumption after converting kWhs and therms to BTUs.[11] Following is a discussion of the in-depth analysis of total energy consumption data in BTU(s).

Total Energy Consumption

The histogram in Figure 4.1 shows the tabulated frequencies of total annual household energy consumption. We chose the 75th percentile point (denoted with red line), to divide the samples into *typical* and *high* consumption groups to facilitate further analysis.

Figure 4.1: Total Energy Consumption Histogram

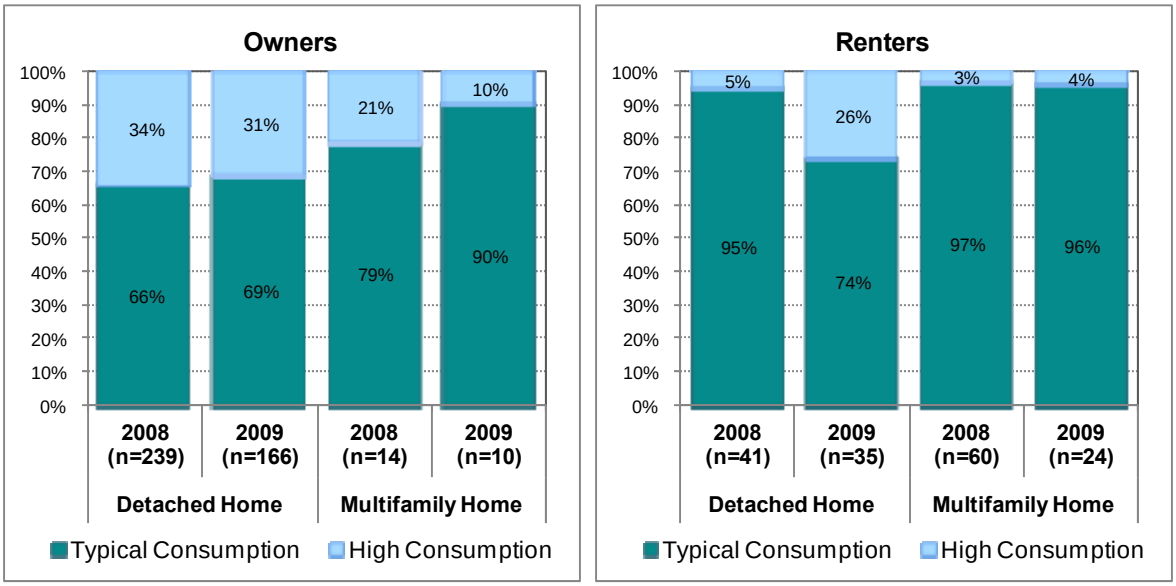


[11] 1 kWh=3,412.3 BTU(s); 1 therm=100,000 BTU(s).

By Type of Home

Figure 4.2 displays the proportions of *high* and *typical* energy use categories among respondents who were renters or owner-occupants of detached single-family houses or multifamily dwellings.

Figure 4.2: Total Energy Consumption by Homeownership and Housing Structure



Within owner-occupied households, 31% of those who lived in detached houses and 10% of those who lived in multifamily homes had high energy consumption in 2009. Among renter-occupied households, 26% of those in detached homes and 4% of those in multifamily homes recorded high energy consumption in 2009. In 2008, only 5% of renter-occupied households in detached homes were identified as high energy users, substantially fewer than in 2009. Moreover, we determined that a greater percentage of households in owner-occupied multifamily dwellings were higher energy users in 2008 than in 2009.

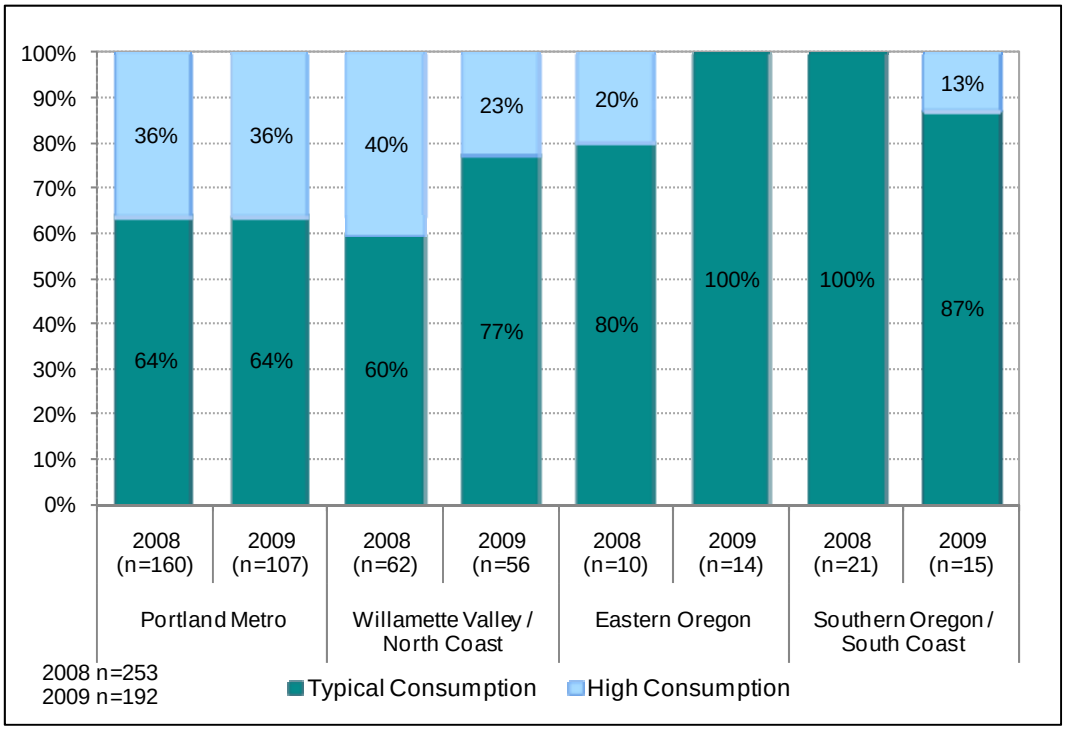
The 2008 analysis indicated that there were significantly more high energy consumers in the owner-occupied households than in the renter-occupied households, regardless if the type of housing was multifamily or a detached single-family home. However, in 2009 we found a significant difference between high and typical energy consumers by housing type ($p<.05$).

By Region

Next, we compared homeowners' total energy consumption per region (Figure 4.3).

We found that regional differences in energy consumption of owner-occupied households were significant in 2008 and 2009 ($p<0.05$). The Portland Metropolitan and Willamette Valley / North Coast regions had a greater concentration of high-energy consumption, owner-occupied households, than did Eastern and Southern Oregon.

Figure 4.3: Total Energy Consumption of Homeowners by Region



By Attitudes and Behaviors

We also compared the attitudes and behaviors toward energy efficiency expressed by respondents in the typical and high total energy consumption owner-occupied households. Table 4.2 and Asterisks denote significant differences between participants and nonparticipants. Levels of significance: *= p<..05; **=p<.001, and ***=p<.0001.

Table 4.3 show these respondents' answers to questions that focused on attitudes and behaviors, as well as selected demographics for the years 2008 and 2009, respectively. They illustrate how these two groups compare; however, not each item is equivalent.

Overall, we observed very few differences in energy-use behaviors and attitudes between typical- and high-energy consumption households in 2008. Demographically, owner-occupied households with higher income and education were more likely to be in the high consumer category ($p<.05$).

As in the 2008 study, we observed very few differences in energy use behaviors and attitudes among respondents in the typical- and high-energy-consumption owner-occupied households in 2009. High-energy-consumption owner-occupied households again tended to be more educated and affluent than typical-energy-consumption households.

Table 4.2: 2008 Low vs. High Energy Consumption Owner-Occupied Households

CHARACTERISTIC	TYPICAL CONSUMPTION HOUSEHOLDS	HIGH CONSUMPTION HOUSEHOLDS	SIGNIFICANCE *(P)*
Heard of Energy Trust	46%	49%	NS
Have Participated in Energy Trust Programs	13%	13%	NS
Level of Concern About Home's Energy Bill (10-Point scale)	7.37	7.23	NS
Percent of Time Lights Are Turned Off When Leaving a Room	72%	75%	NS
Percent of Time Laundry Is Done with Washer Fully Loaded	69%	73%	NS
Had a Home Energy Audit/Review	24%	25%	NS
Have a Plasma TV Larger than 42"	2%	6%	NS
Have CFL or Twisty/Swirly Bulbs In Home	83%	86%	NS
Have Purchased ENERGY STAR® Appliance/Electronics	82%	87%	NS
Convinced of Global Warming	73%	77%	NS
Home Built Before 1969	36%	41%	NS
Primary Householder's Age Is 39 Years or Younger	12%	10%	NS
Primary Householder Is Without a Four-Year College Degree	50%	33%	*
Household Income Is Below $50,000	36%	13%	**

Asterisks denote significant differences between participants and nonparticipants. Levels of significance: *= p<..05; **=p<.001, and ***=p<.0001.

Table 4.3: 2009 Low vs. High-Energy-Consumption Owner-Occupied Households

CHARACTERISTIC	LOW CONSUMPTION HOUSEHOLDS	HIGH CONSUMPTION HOUSEHOLDS	SIGNIFICANCE *(P)*
Heard of Energy Trust	48%	60%	NS
Have Participated in Energy Trust Programs	16%	16%	NS
Energy Concerns (composite 10-Point scale)[a]	6.83	6.99	NS
Perceived Efficacy of Energy Efficiency Actions (composite 10-point scale)[b]	6.94	7.13	NS
Number of Energy Efficiency Measures Done in the Home in the Last 12 Months[c]	1.37	1.25	NS
Have CFL or Twisty/Swirly Bulbs in Home	91%	91%	NS
Consider ENERGY STAR® When Purchasing Appliance/Electronics	57%	65%	NS

Continued

CHARACTERISTIC	LOW CONSUMPTION HOUSEHOLDS	HIGH CONSUMPTION HOUSEHOLDS	SIGNIFICANCE *(P)*
Home Built Before 1970[d]	34%	37%	NS
Primary Householder's Age Is 55 Years or Younger[e]	44%	45%	NS
Primary Householder Does not Have a Four-Year College Degree	58%	34%	*
Household Income Is Below $50,000	39%	14%	*

a. We created the composite scale from variables that are larger dimensions identified in the factor analysis. The term *energy concerns* includes concerns about global warming, rapid consumption of national energy supplies, and their support of energy conservation as a way to decrease the need for new power plants.

b. Perceived efficacy of energy efficiency measures is a construct of respondents' perceptions of how well various energy efficiency measures they can employ in their homes work to mitigate environmental impacts (see Appendix D).

c. This is a count of infrequent energy efficiency actions. (See Appendix D for an explanation of the term "infrequent" and a list of actions we included in the count).

d. We chose the year 1970 because the years 1970 to 1979 represent the average range of the years in which the houses we selected for this sample were built.

e. We chose age 55 because 55 to 59 was the average age range of respondents selected for this sample.

Asterisks denote significant differences between participants and nonparticipants. Levels of significance: *= p<..05; **=p<.001, and ***=p<.0001.

SEGMENTATION

Method

We used factor analysis, regression, and clustering techniques to segment the sample population. We employed factor analysis to explore the structure of the dataset by grouping the variables into factors, and regression analysis to test if the derived factors and the demographic variables were significant predictors of household energy consumption. We placed all significant variables and factors in the regression model into the two-step clustering algorithm. We further explored the derived segments through crosstab chi-square procedures. We used SPSS algorithms for all of these analyses. We discuss the procedures and interpretation of each technique in greater detail in Appendix D.

Result

In 2009, we identified six distinct segments based on the final two-step cluster analysis. Three segments were similar to the 2008 segments[12] and other three were not. The differences between

[12] 2008 segmentation results:

Strugglers were renters, who lived in electrically heated homes. They comprised 21% of the respondents. They were either transitional younger people or older people who were in a survival mode. Energy

continued…

the 2008 and 2009 segments are likely attributable to changes in the survey questions and improved renter samples in 2009. In fact, survey questions in 2009 are deemed better, since they were improved based on the 2008 findings. Thus, the segmentation profile developed in 2009 is the profile that we believe should be used as a baseline if this type of survey is to continue in the future.

Even though we believe that the 2009 segmentation profile is more robust than that from 2008, there are some concerns that should be mentioned. The chosen segmentation analysis is sensitive to the choice of the variables input into a clustering algorithm. The variable choice is determined through a regression analysis, specifically energy consumption regression analysis. There were many missing cases in the regression analysis on energy consumption. The billing data was limited (Table 4.1); hence, only a third of the sample had energy consumption data. This is a problem because two-thirds of the cases were dropped from the regression analysis. This issue is further discussed in Appendix C. In the final segmentation profile, we named each segment to reflect its attitudinal, behavioral, and demographic attributes (Figure 4.4). Following the descriptive summary of each segment, in-depth analytical procedure is discussed.

- **Maybe Later** consists of households of predominantly younger respondents with low incomes who are highly concerned about energy consumption in general. They comprise 15% of the respondents. They also have a high opinion of the efficacy of energy efficiency measures for mitigating environmental impacts. Since most of them are renters in multifamily residences and have low incomes, they are less likely to install efficiency measures. However, members of these younger, smaller households might be transient; they might earn higher incomes in the future or become homeowners.

---

consumption in these homes was low. Due to limitations related to being renters and financial constraints, their ability to install energy efficiency measures was limited; even CFL installation rates were quite low for this segment. They also were the least informed on energy efficiency issues.

Main Street Oregonians were homeowners who most commonly lived in non-urban areas. They comprised 27% of the respondents. They were older and tended to be middle-income households. Most of these homes were electrically heated. More than half of these households were high energy consumers. They were moderately informed about energy efficiency issues and some of these households had participated in Energy Trust programs.

Progressive Savers were younger households with middle incomes that were highly aware of energy efficiency issues; energy conservation was part of their lifestyle, even though they might not have participated in Energy Trust programs. They included renters and homeowners, most of whose homes were electrically heated. They comprised 17% of the respondents.

Willing and Able consisted of homeowners and renters who used natural gas to heat their homes. They were younger in relation to other groups, except *Progressive Savers*, and were financially successful. Most were relatively low energy users. They tended to be highly aware of energy efficiency issues and their Energy Trust program participation was high. They comprise 17% of the respondents.

Comfortably Established were homeowners who lived in natural gas heated homes and tended to be high consumers of energy. They comprised 18% of the respondents. They were older and financially successful, with a high level of education. Though their energy efficiency awareness was somewhat average, they were more likely to participate in Energy Trust programs than any other segment. They were slightly concentrated in urban areas, but present across the state.

- **Strugglers** are renters who live in multifamily residences, most of which are electrically heated. They comprise 13% of the respondents. They are younger and middle-aged. In addition, they appear to be in survival mode, since their incomes are low. Energy consumption in these homes can be classified as low-to-medium. Because most of these respondents rent their homes and appear to have financial constraints, it is likely that they have a limited ability to install energy efficiency measures. Even CFL installation was lower in this group than in the other group except for the *Show Me* respondents. Interestingly, they are concerned about energy consumption in general, but they have a low opinion of the efficacy of energy efficiency measures for mitigating environmental impacts.

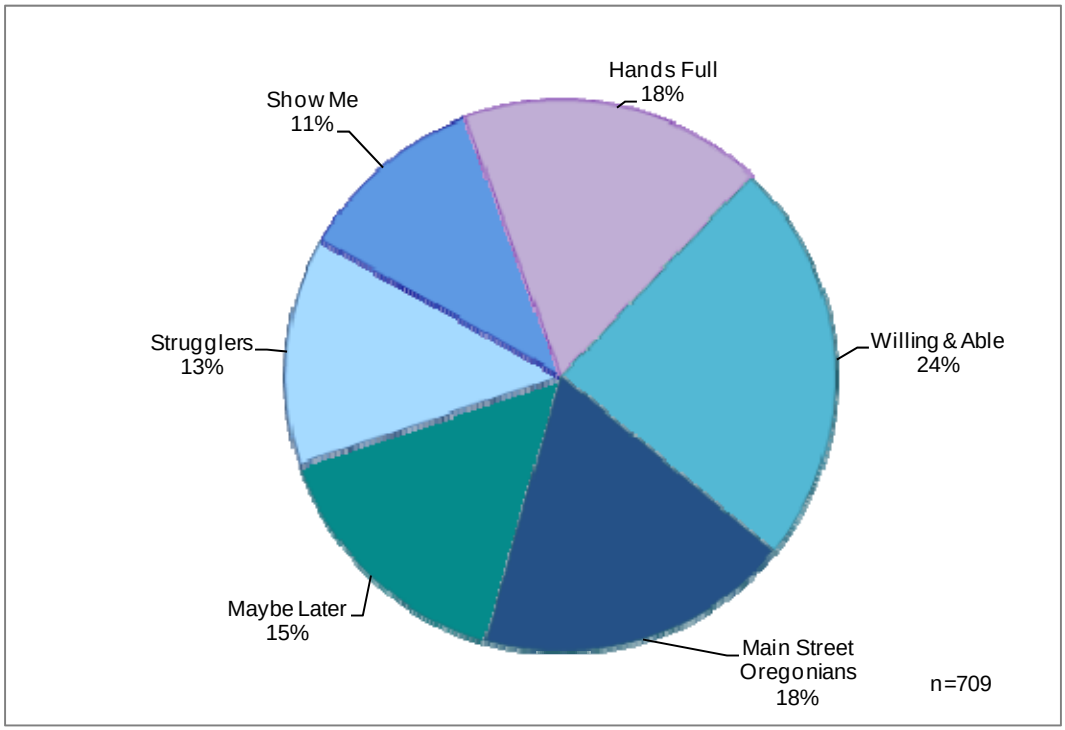
- **Show Me** respondents are homeowners who live in homes heated by natural gas and/or electricity, and make up 11% of respondents. They tend to be low consumers of energy. These homeowners are older, moderately financially successful, with at least some college background, usually living in Eastern Oregon. In terms of their attitudes, they are the least concerned about energy consumption in general, and have a lower opinion of the efficacy of energy efficiency measures for mitigating environmental impacts than other segments except *Hands Full*.

- **Hands Full** respondents are homeowners who use electricity and fuels other than natural gas to heat their homes. They comprise 18% of the respondents. They are predominantly 45 to 59 years old, and have larger families and lower incomes. Their energy consumption is relatively low, although some are higher energy consumers. Generally, these homeowners are somewhat concerned about societal energy consumption, and they have a fairly low opinion of the efficacy of energy efficiency measures for mitigating environmental impacts.

- **Willing and Able** consists of homeowners who use natural gas to heat their homes. They comprise 24% of the respondents. In general, they were older, more educated, and more financially successful than respondents in the other groups. Their energy consumption is medium-to-high, and some of them consume very high amounts of energy. They tend to have high opinions of the efficacy of energy efficiency measures for mitigating environmental impacts and their Energy Trust program participation is high. These homeowners are a prime target for Energy Trust and Energy Trust seems to be reaching this market fairly successfully.

- **Main Street Oregonians** primarily consist of homeowners who lived in non-urban areas, are older, and generally live in low-income households. They comprise 19% of the respondents. Most of these homes are electrically heated. Their energy consumption varies from low to high. They are not as concerned about energy consumption in general and they have lower opinions of the efficacy of energy efficiency measures for mitigating environmental impacts.

Figure 4.4: 2009 Segmentation Clusters



Attitudinal and Behavioral Variables

Figure 4.5 illustrates each segment's score (mean value) according to the respondents' level of energy concerns and Figure 4.6 their belief in the efficacy of energy efficiency measures for mitigating environmental impacts. The term *energy concerns* represents respondents' concerns about how the use of energy relates to global warming and the rapid consumption of national energy supplies, and their support of energy conservation as a way to decrease the need for new power plants. "Perceived efficacy of energy efficiency measures" is a construct of respondents' perceptions of the efficacy of various energy efficiency measures they can employ in their homes to mitigate environmental impacts. Both of these variables are constructs composed of numerous items, and are measured by a composite score we created during the factor analysis (see Appendix D). In general, scores higher than the overall mean exemplify respondents' greater concerns about energy use or their higher perceived efficacy of energy efficiency measures. Similarly, scores lower than the overall mean reflect respondents' lower concerns about energy use or their lower perceived efficacy of energy efficiency measures.

Figure 4.5: Energy Concern Levels

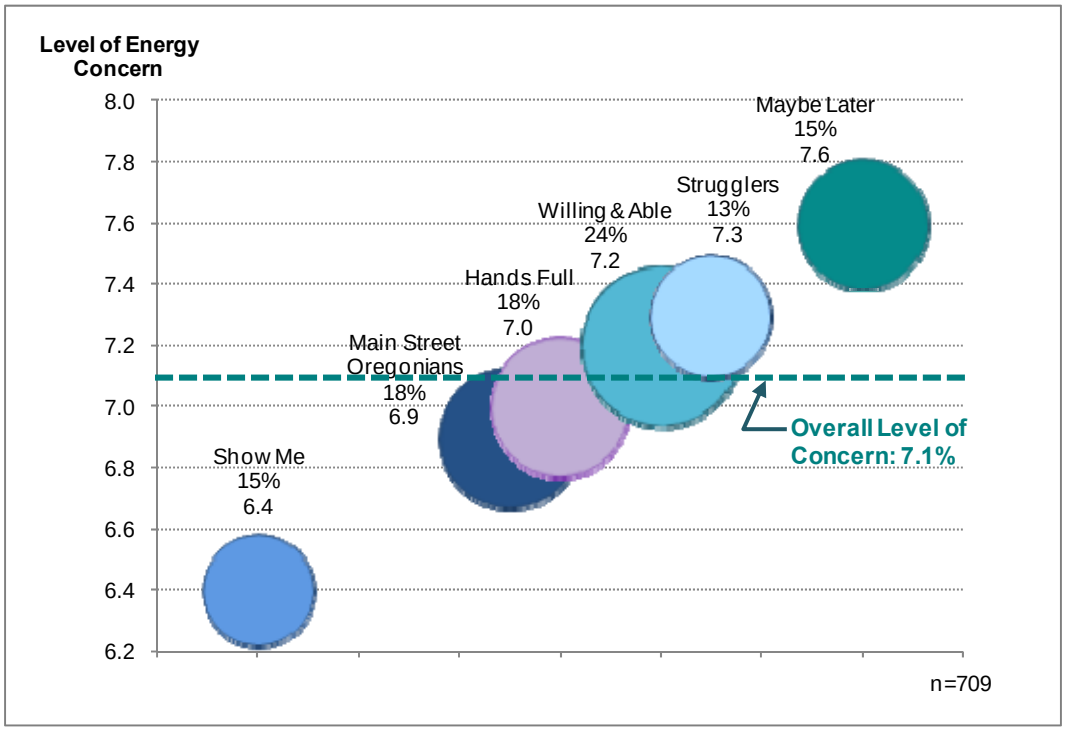
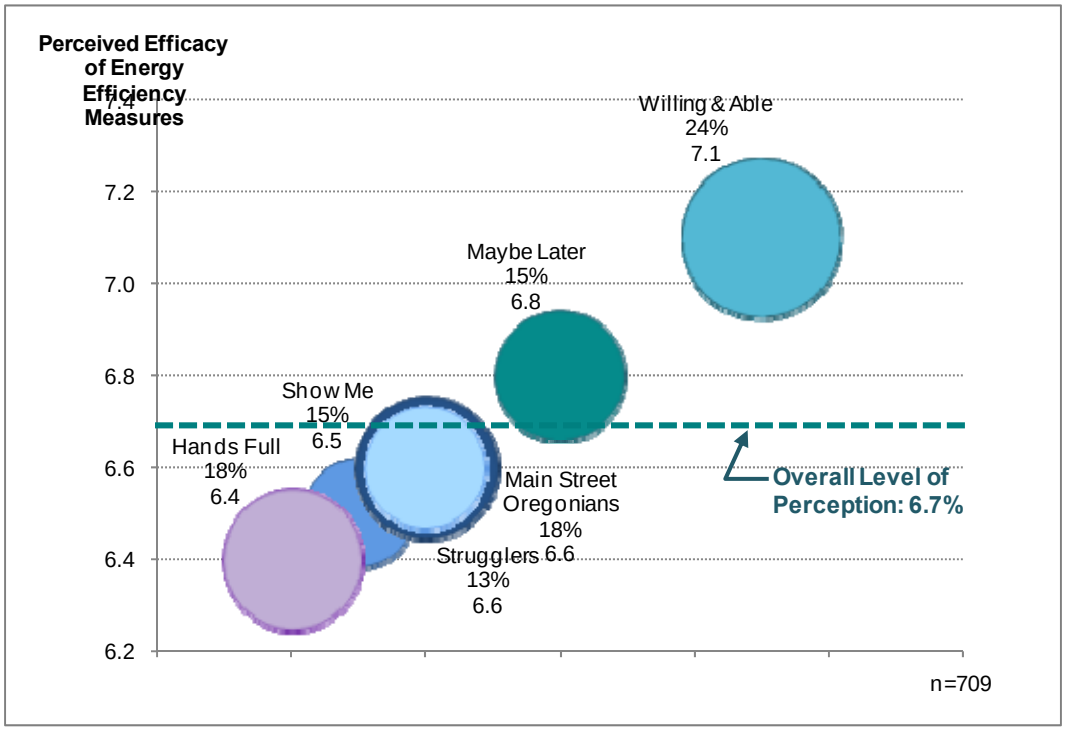


Figure 4.6: Perceived Efficacy of Energy Efficiency Measures



Households in the *Show Me* segment had the lowest energy concern score and a lower perceived sense of the efficacy of energy efficiency measures for mitigating environmental impacts. Households in the *Hands Full* segment had the lowest sense of the efficacy of energy efficiency measures. In contrast, households in the *Maybe Later* segment exhibited the highest energy concern and above average perceived efficacy of energy efficiency measures. The households with the highest perceived sense of the efficacy of energy efficiency measures were in the *Willing & Able* segment. These households also had slightly above average energy concerns.

Figure 4.7 displays respondents' participation in Energy Trust programs by segment. *Willing and Able* households had significantly higher participation rates in Energy Trust programs (16%) than any other segment. The other segments participated in the programs, but at rates that were lower than the average for Oregon.

Figure 4.7: Energy Trust Participation by Segment

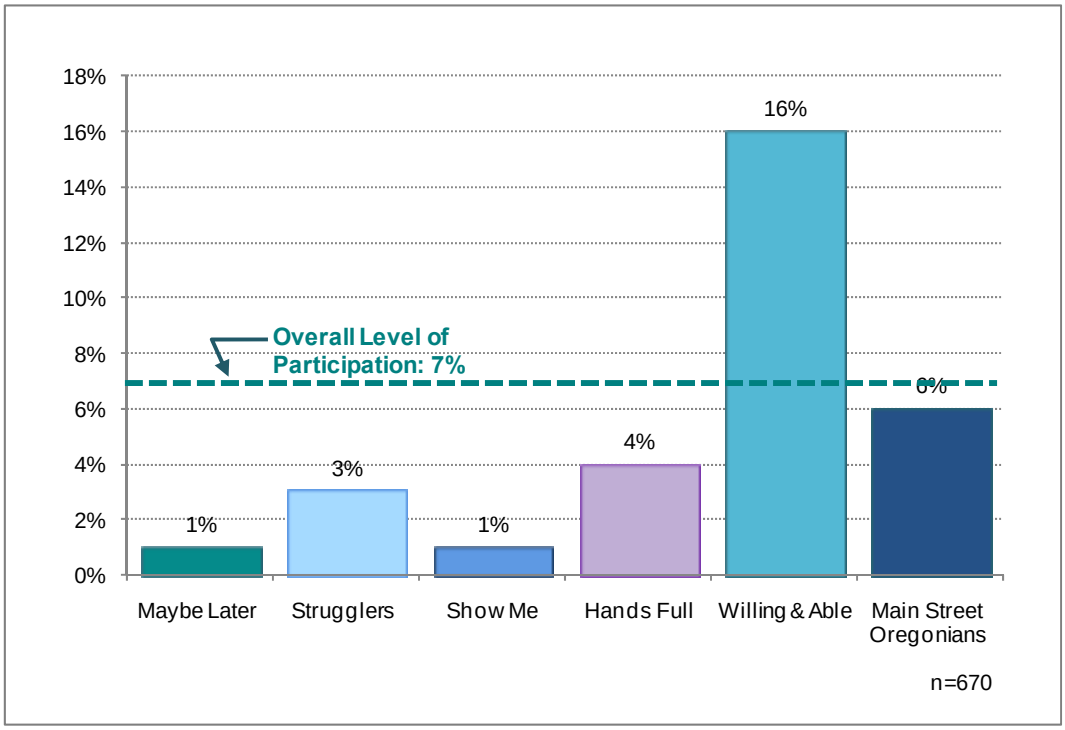


Figure 4.8 shows the distribution of the six segments within low, low-medium, medium-high, and high energy consumption groups, measured by annual BTU consumption. A large proportion of medium-high and high energy consuming households were in the *Willing & Able* segment (67% and 88%, respectively). Low energy consumer households mainly were in the *Strugglers*, *Maybe Later*, and *Hands Full* segments (30%, 24%, and 18% respectively).

Figure 4.9 shows the distributions for the number of CFLs installed in homes. Our data indicate that households in the *Maybe Later*, *Show Me* and *Strugglers* segments had the fewest CFLs.

Figure 4.8: Clusters by Energy Consumption

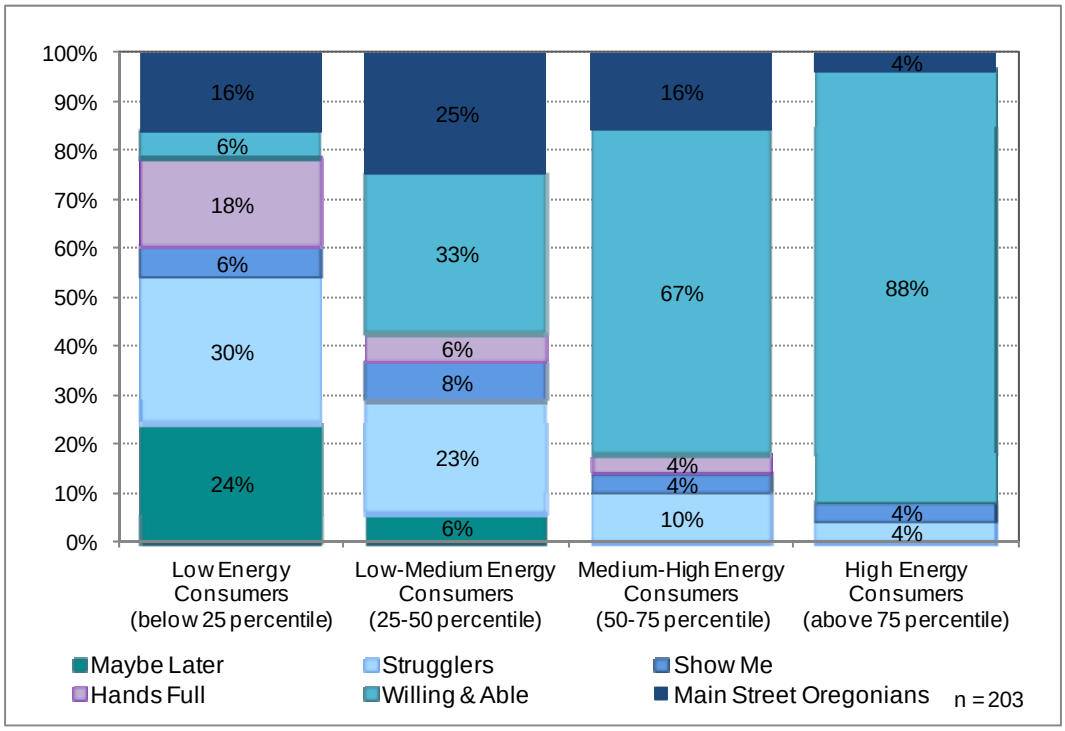


Figure 4.9: Clusters by the Number of CFLs Installed

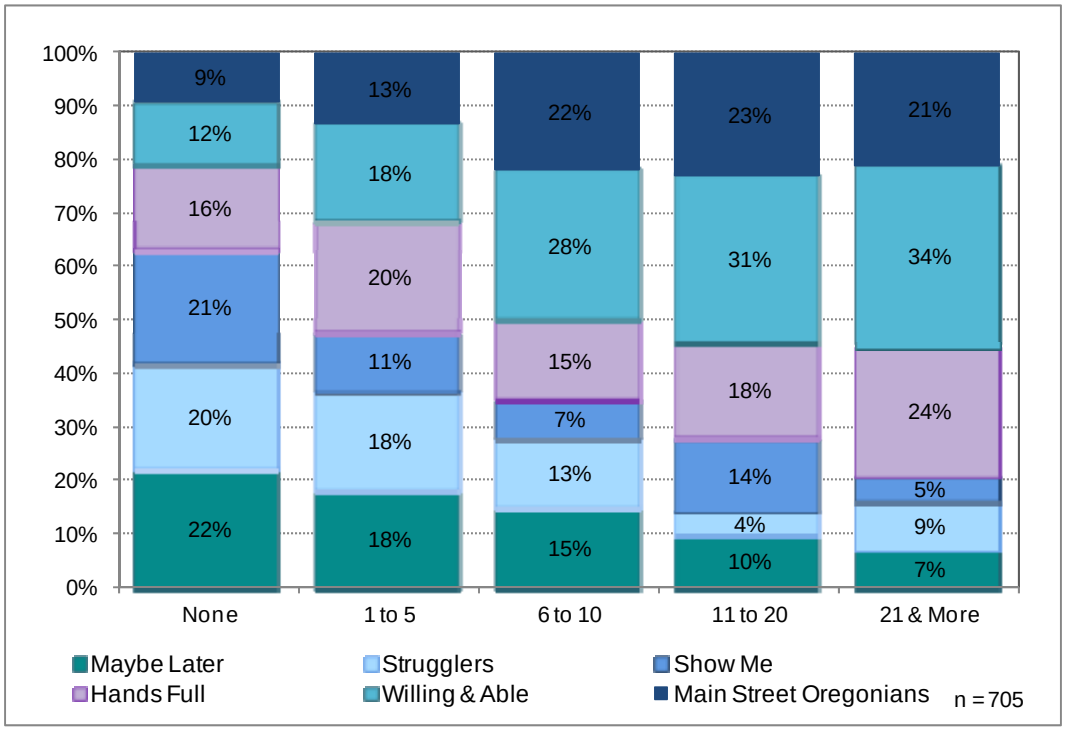
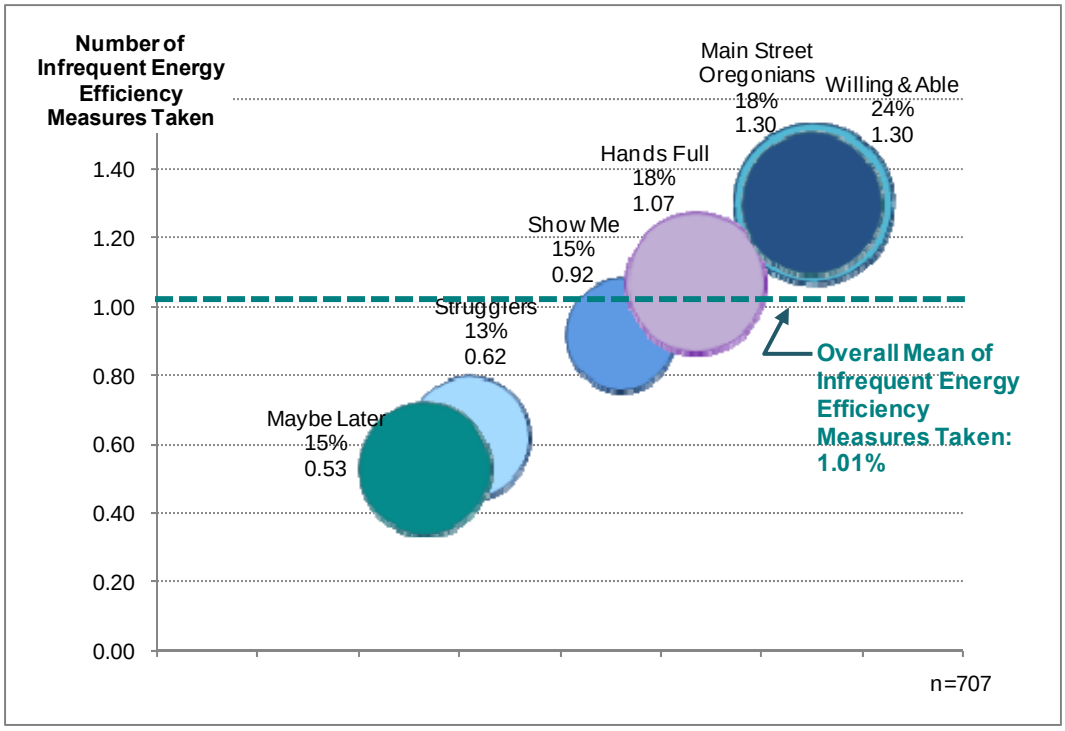


Figure 4.10 shows the mean value of the number of "infrequent" energy efficiency actions respondents had taken in the last 12 months. Adding insulation, purchasing efficient appliances, installing more efficient windows, and other such actions listed in Appendix D fall into this category. These infrequent actions differ from repetitive energy curtailment behaviors, such as turning off lights or reducing thermostat settings at night. These distinctions are important because they define two types of behaviors people can do to reduce energy use at home. Infrequent energy-efficient behaviors are commonly related to home improvements and will have long-lasting energy-saving impacts.

Figure 4.10: Number of Infrequent Energy Efficiency Actions Done in the Last 12 Months



Note: The bubbles represent the proportion of the cases in the segment.

We counted infrequent energy efficiency measures reported by each household. On average, households installed one infrequent energy efficiency measure during 2009. *Strugglers* and households in the *Maybe Later* segment were below the average for such measures. This was not surprising, since these were primarily renter-occupied households and renters generally do not install new windows or other home-improvement measures without the owner's consent. *Willing & Able* and *Main Street Oregonians* were above the average for installing infrequent energy efficiency measures. Again, this was not surprising, since both of these segments consist of owner-occupied households, many of which had participated in Energy Trust programs (see Figure 4.7).

Demographic Variables

As shown in Figure 4.11, the six segments were distributed across the four regions. Interestingly, all of the households in the *Show Me* segment were located in Eastern Oregon. Most of the households in the *Willing & Able* segment were located in the Portland Metropolitan and Willamette Valley / North Coast areas. In Southern Oregon / South Coast, *Main Street Oregonians* (36%) and households in the *Hands Full* segment (37%) were dominant. *Strugglers* and *Maybe Later* households were seen more frequently in the Portland Metropolitan area than any other.

Figure 4.11: Clusters by Region

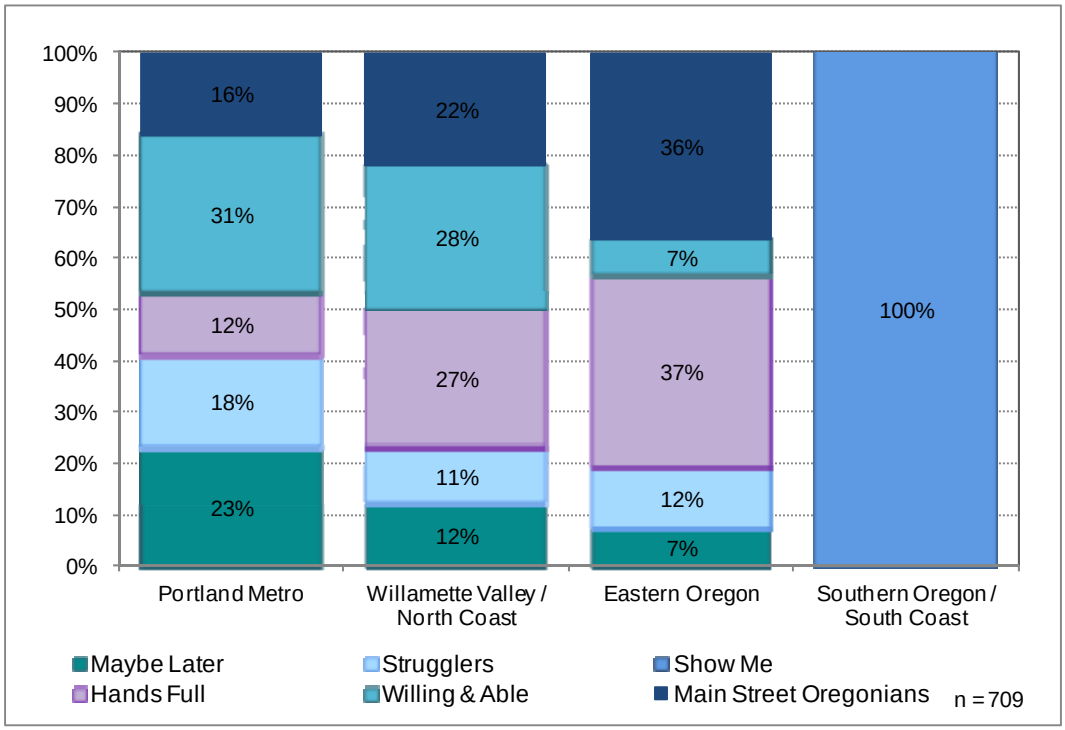


Table 4.4 illustrates differences between the segments regarding the presence of an air-conditioner in the home. The most notable finding is that *Maybe Later* and *Hands Full* households did not own an air-conditioner.

Table 4.4: Presence of an Air-Conditioner

SEGMENTS	A/C
Maybe Later	0%
Strugglers	92%
Show Me	65%
Hands Full	0%
Willing & Able	64%
Main Street Oregonians	100%

Figure 4.12 shows homeownership within each segment and Figure 4.13 shows the type of housing most dominant in each segment. *Strugglers* and *Maybe Later* households predominantly were renters living in multifamily dwellings. Households in other segments predominantly were homeowners who lived in detached single-family dwellings.

The type of space-heating energy source used by each segment is shown in Figure 4.14. Electricity is the dominant fuel type used by *Strugglers*, *Maybe Later*, *Main Street Oregonians*, and *Hands Full* households. Other fuel types, such as propane and oil, were used by some households in the *Show Me* and *Hands Full* segments (29% and 45%, respectively). All of the *Willing and Able* households used natural gas as their primary heating fuel.

Figure 4.12: Clusters by Homeownership

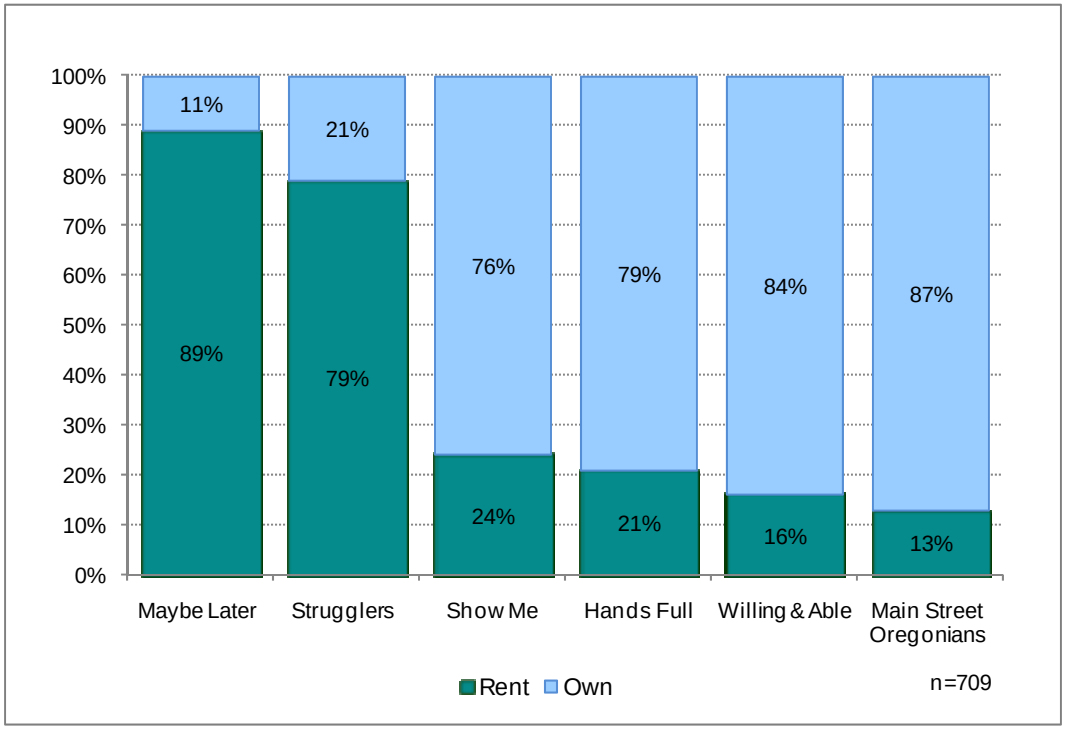


Figure 4.13: Clusters by Type of Housing

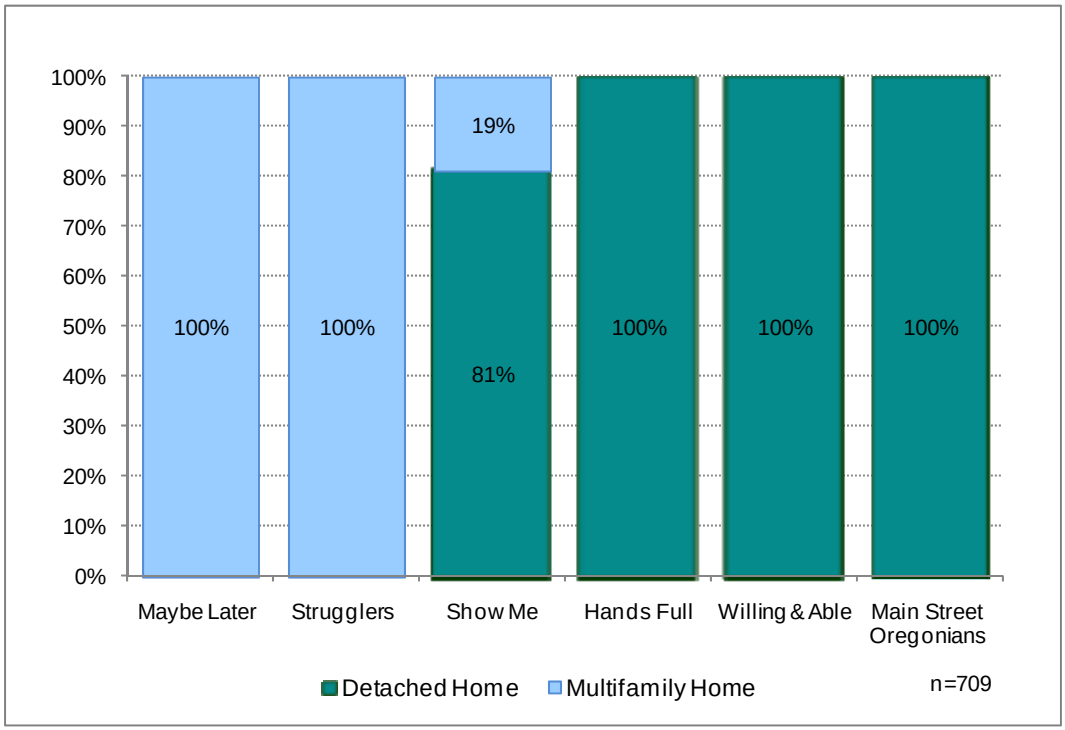


Figure 4.14: Clusters by Space Heating Fuel

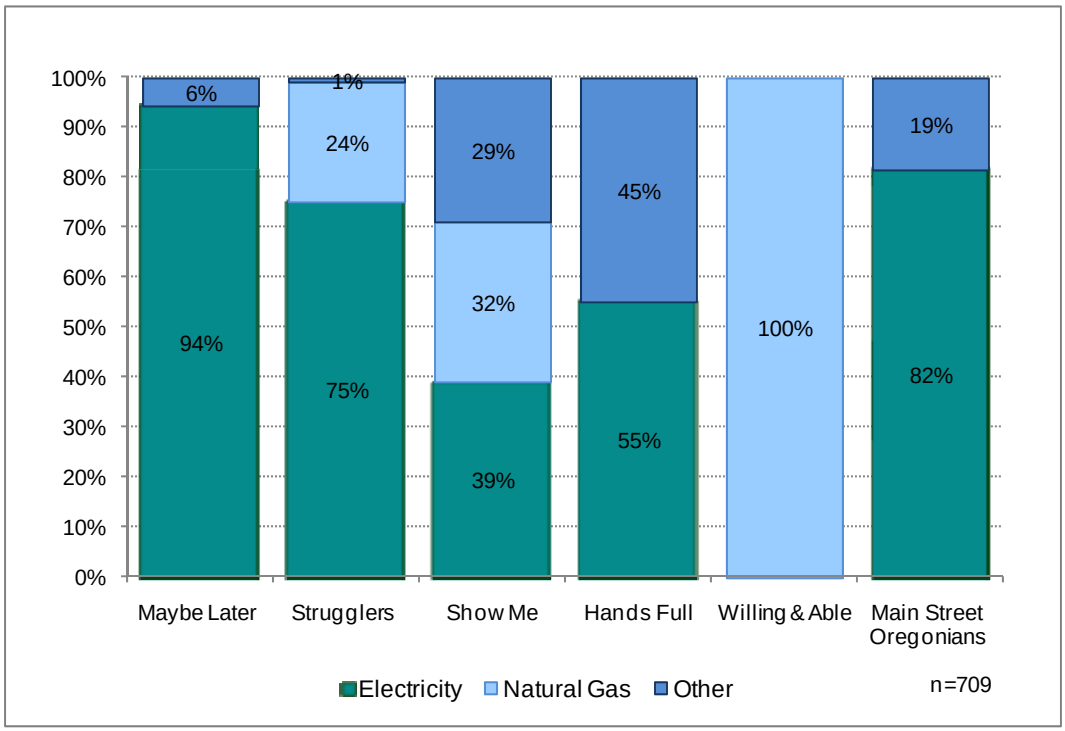


Figure 4.15 shows the distribution of respondents' homes within each segment based on the decade in which the homes were built. *Strugglers* and *Main Street Oregonians* occupied the newest houses; median homes in these segments were built between 1980 and 1989.

Figure 4.15: Clusters by House Age

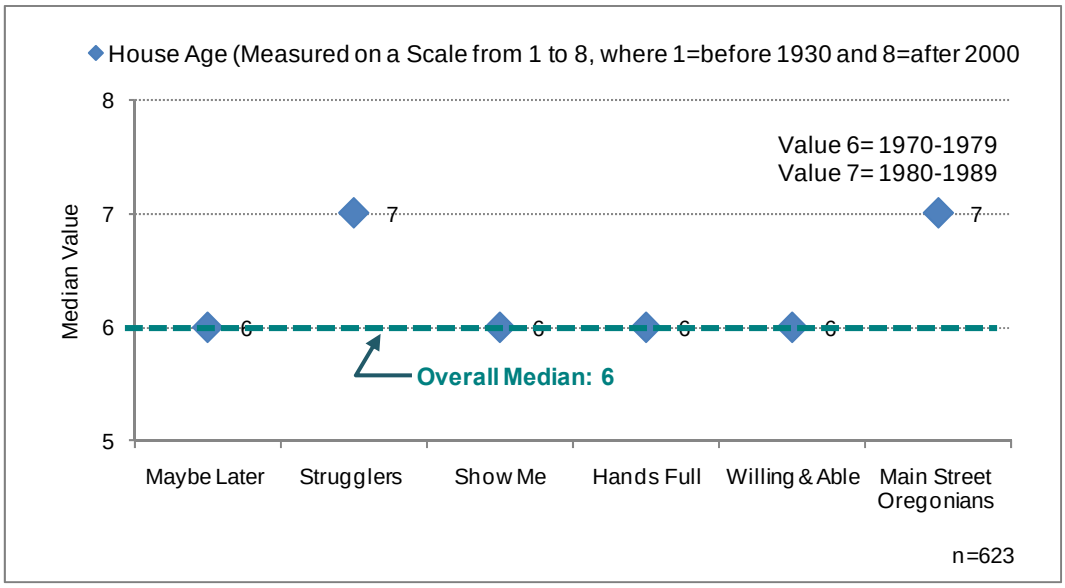


Figure 4.16 shows household income ranges. *Strugglers*, *Hands Full*, and *Maybe Later* households generally had below-median or median incomes. *Main Street Oregonians'* households had lower and higher incomes, while many *Willing and Able* households appeared to have higher incomes.

The distribution of segments by primary householder's age is shown in Figure 4.17. The youngest respondents generally were in the *Strugglers* and *Maybe Later* segments. Many householders in *Willing and Able, Main Street Oregonians, and Hands Full* segments were at least 45 years old.

Figure 4.16: Clusters by Household Income

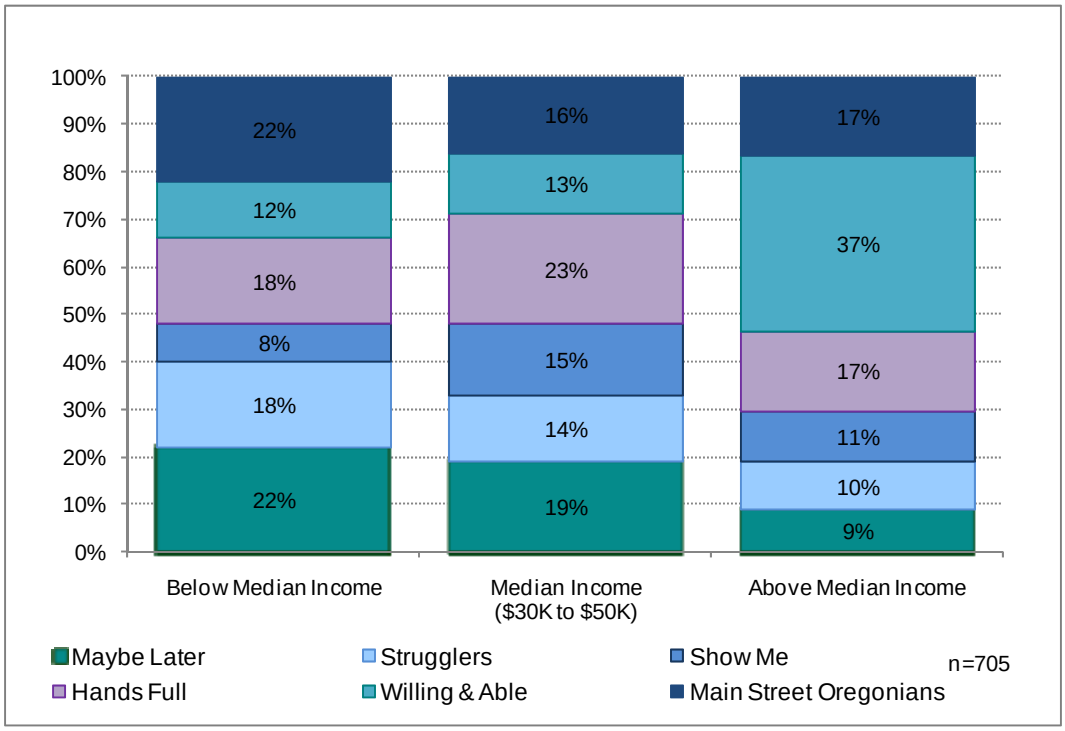
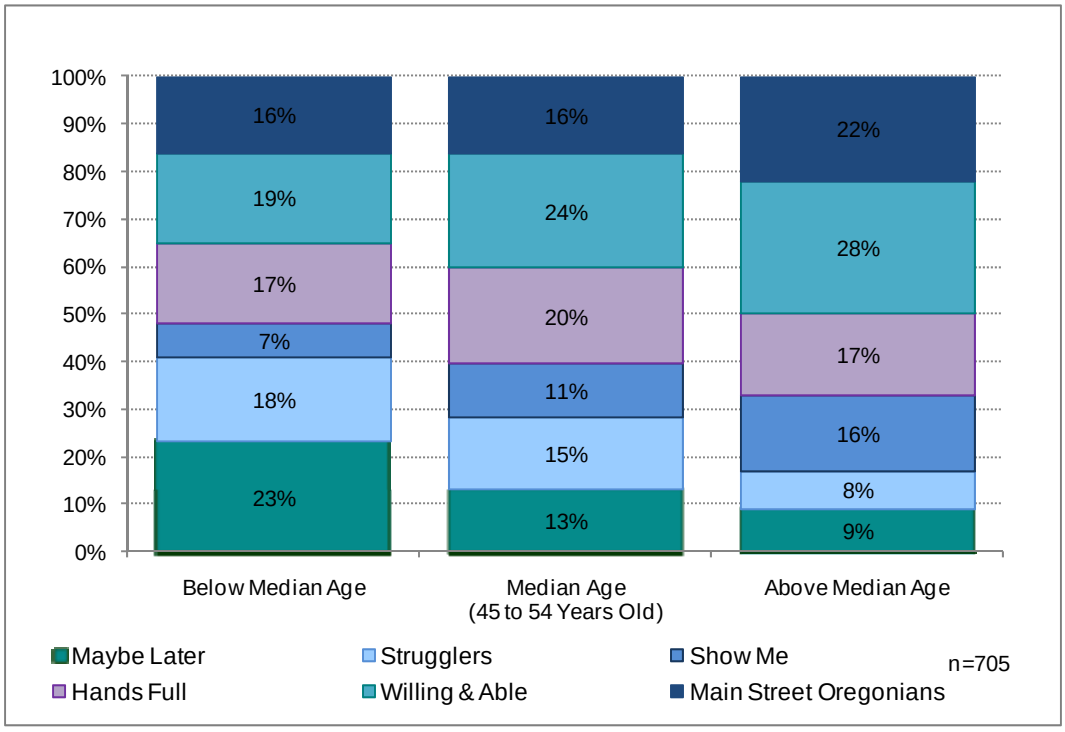
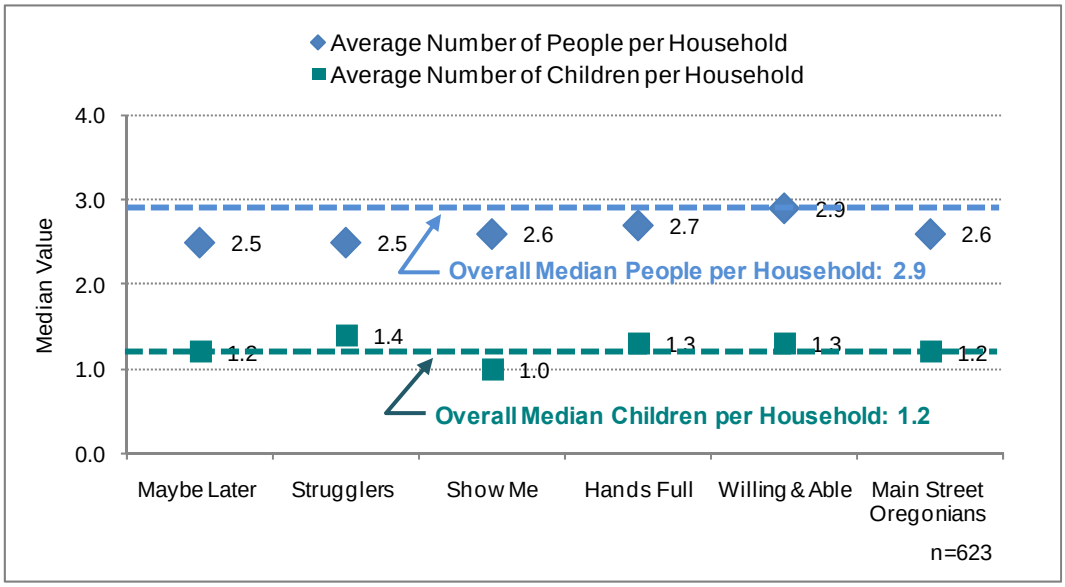


Figure 4.17: Clusters by Primary Householder's Age



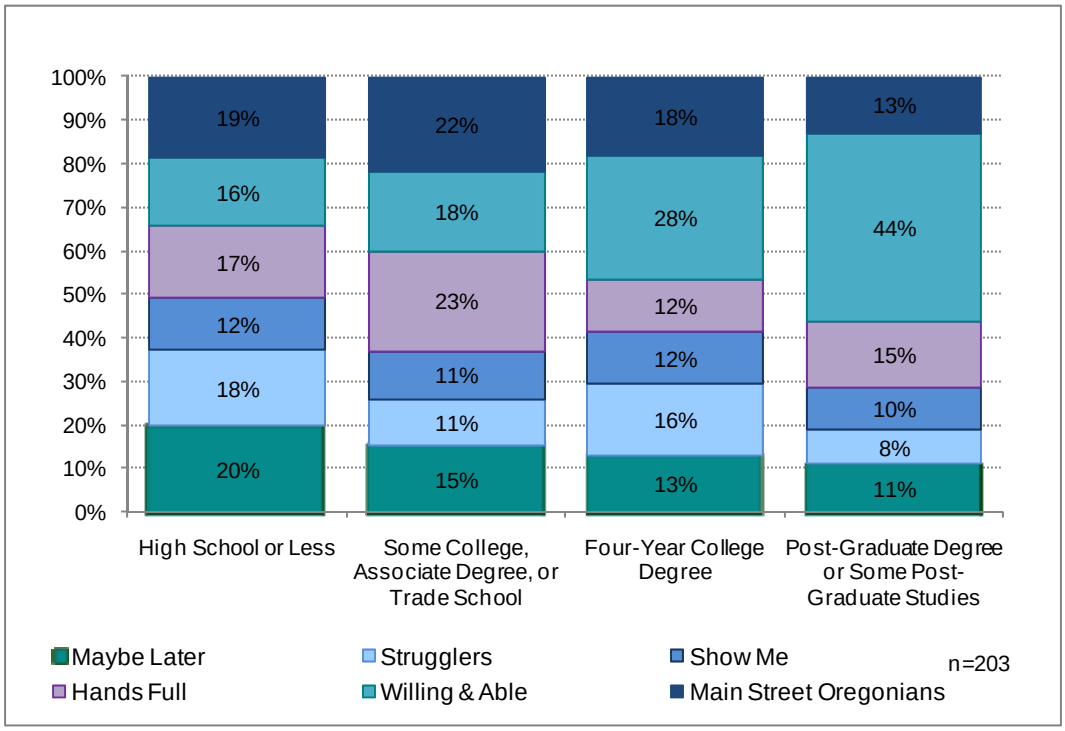
As for household sizes (the number of people living in a residence), we noted that *Willing & Able* and *Hands Full* households were larger than the rest of the groups (Figure 4.18). However, on average, these largest households did not have the most children; the *Strugglers* held this distinction (Figure 4.19).

Figure 4.18: Clusters by Household Size



Finally, Figure 4.19 shows the highest educational level achieved by the primary householders. Households with some college or less were fairly evenly represented in all segments; however, *Willing & Able* clearly had a greater percentage (72%) of respondents with at least a four-year college degree. This indicates that *Willing and Able* households generally were more educated than households in the other segments.

Figure 4.19: Clusters by Primary Householder's Education Level



5 FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

FINDINGS

Energy Trust Awareness and Participation

- In 2009, a total of 36% of the respondents in Oregon and 41% within the Energy Trust targeted territory reported being aware of Energy Trust. We estimate the participation rate in Energy Trust programs in the state at 7% and at 9% in the Energy Trust territory. Between 2008 and 2009, the reported awareness of Energy Trust in the state rose by a substantial eight percentage points, while the participation rate increased by one percentage point.
- Awareness of Energy Trust increased in most parts of Oregon.
- The greatest increases in participation occurred among households in the Portland Metropolitan area.
- Customers of PGE and PacifiCorp whose homes are electric-heated were less likely to use Energy Trust services (5%) than other homes that are eligible to participate in Energy Trust programs: 48% of the respondents that are qualified for Energy Trust services are in this type and they are scattered across the state.
- Of the respondents who said they were aware of Energy Trust, 40% said they did not know much about Energy Trust's programs.
- Respondents most frequently said they first learned about Energy Trust from their utilities' website, mail inserts, representatives, or advertising.
- Households served by an electric utility other than PGE, or a natural gas utility other than NW Natural, had significantly lower participation rates in Energy Trust programs.
- Energy Trust participants were more likely to be single-family home dwellers, age 45 to 54, more educated, and have higher household incomes.
- Households that use natural gas as their primary energy source for heating were more likely to participate in Energy Trust programs.
- Participants were highly satisfied with Energy Trust services.
- Overall findings of participants' demographic characteristics were consistent with 2008 findings.

Attitudes, Perceptions, and Behaviors

- Participants were more likely to say that replacing appliances with more efficient ones, installing insulation, upgrading windows, changing thermostat settings to reduce energy use, or driving less were high priority actions that could mitigate environmental impacts related to energy use.
- Participants were more likely to believe that global climate change is a result of high energy use.
- Renters are concerned about general energy issues, especially in connection with cost. They expressed a relatively high desire to be energy efficient, but perceived that they are constrained by their limited ability to take action.
- Homeowners living in older homes were more likely to consider their homes less energy-efficient than homeowners living in newer dwellings.
- Between 2008 and 2009, reported CFL penetration increased substantially (+7 percentage points) among nonparticipants. This was a greater increase than we observed among participants (+4 percentage points). Overall, CFL penetration among residential customers increased 6 percentage points since 2008.
- Forty percent of respondents reported they had programmable thermostats, but only 66% of them used automatic features to control indoor temperatures. Significantly, more participants than nonparticipants reported they had programmable thermostats.
- Nonparticipants were more likely to own room air conditioners.
- Ninety-two percent of the surveyed respondents said they used at least one power strip and a majority of them (68%) never or rarely turned off the main switch.

Green Power and Carbon Offset Programs

- Participation in green power programs was 13% to 16% for electric utilities and 4% for NW Natural's carbon offset program. EWEB customers' participation in their utility's *Greenpower* program increased a significant 9 percentage points between 2008 and 2009.

Market

- Nonparticipants and participants said they used the same primary news sources: television, newspapers, and online outlets. However, participants said they most frequently sought news from newspapers, while nonparticipants more often said they relied on television as their primary news source.
- Approximately 50% of the respondents who inquired about renewable energy information obtained the information through online outlets.

- Overall awareness of ENERGY STAR® increased by 5 percentage points between 2008 and 2009. Participants were more likely to be aware of ENERGY STAR® and to consider ENERGY STAR® when purchasing appliances.
- Participants might be seeking additional opportunities to take energy efficiency actions by taking advantage of Energy Trust programs: 41% of participants (12% of the nonparticipants) said they were considering participating in Energy Trust programs in the next 12 months.

Energy Consumption

- Homeowners and renters living in detached single-family dwellings were likely to use more energy than homeowners and renters in multifamily dwellings.
- Regional differences in the energy consumption of owner-occupied households were significant. The Portland Metropolitan and Willamette Valley / North Coast regions had the highest concentration of high-consumption owner-occupied households, while the Southern Oregon / South Coast and East of the Cascade regions had low concentrations of high-consumption households.
- High-consumption owner-occupied households were significantly more highly educated and had higher incomes.
- No significant differences between high- and typical-energy users were observed in relation to Energy Trust awareness and participation, energy-specific attitudes and perceptions, and energy efficiency behaviors.

CONCLUSIONS

We offer the following conclusions and recommendations.

- ***Conclusion 1:*** **Since 2008, awareness of Energy Trust has improved in most parts of Oregon.** Though we did not explicitly track what marketing channels had attracted people's attention, the findings suggest that the 2009 marketing efforts increased overall recognition of Energy Trust and may have successfully affected program participation.

  Recommendation 1: The next Oregon Residential Energy Awareness Study should include questions that obtain unaided responses as to respondents' awareness of different marketing messages offered about Energy Trust (i.e., those by the utilities and Energy Trust).

- ***Conclusion 2:*** **Six different market segments were identified from the 2009 survey analysis, some of which are similar to the ones identified in the 2008 study**. The differences are likely attributable to changes in the survey questions and improved renter samples in 2009.

- **Maybe Later** – young renters with green attitudes
- **Strugglers** – renters in survival mode
- **Show Me** – Eastern Oregonians who are less receptive to energy efficiency
- **Hands Full** – large families with lower incomes and lower perception of the efficacy of energy efficiency
- **Willing and Able** – financially capable, higher energy consumers with greener attitudes
- **Main Street Oregonians** – non-urban residents who are receptive to green living

Three segments – *Strugglers*, *Willing and Able*, and *Main Street Oregonians* – are similar to the ones we identified in the 2008 study regarding energy efficiency attitudes and demographic characteristics

Willing and Able and *Main Street Oregonians* are the most attractive market segments to Energy Trust, since they include the most high energy consumers and are more likely to participate in Energy Trust programs, given their high financial and attitudinal readiness to be engaged in efficiency actions.

The *Maybe Later* households are less likely to participate in Energy Trust programs today, primarily because of their young age, rental status, and financial constraints. This segment exhibits a strong desire to become more energy-efficient; therefore, they have the greatest potential to become an attractive segment for Energy Trust, as they earn more money and become homeowners.

The *Show Me* segment, on the other hand, appears to have the capacity to take many efficiency actions, but they are less aware and less convinced of the benefits they might experience by taking such actions.

> ***Recommendation 2:*** **Design programs that primarily target the *Willing and Able* and *Main Street Oregonian* segments, as these include those residents most likely to participate and provide energy savings**. Enhanced marketing efforts that target the *Maybe Later* and *Show Me* segments could be effective by increasing their awareness of the benefits of taking energy efficiency actions and by targeting low-cost/no-cost actions that could have immediate effects.

➡ ***Conclusion 3:*** **Renters are interested in learning what they can do to reduce energy use**. Renters, who tend to be younger, are generally more uneasy about current energy issues than are homeowners, and were the most interested in learning what they can do to reduce their environmental footprint. Simultaneously, they expressed their lack of knowledge or access to means to do so.

> ***Recommendation 3:*** **Actively engage renters by promoting CFLs and low-cost/no-cost measures through creative communication channels such as**

YouTube, Twitter, and other Web2.0 and 3.0 tools, and by exploring program options that can influence landlord decision-making.

➡ ***Conclusion 4:*** **A larger sample of customers with energy consumption billing data could provide a more meaningful segmentation analysis.** Information provided by the cases with consumption data was used to determine the key variables for the segmentation analysis. Thus, reducing the amount of missing billing data will improve the reliability and consistency of segmentation solutions.

Recommendation 4: **Energy Trust should explore how to ensure that future surveys have access to samples that include energy consumption data upfront,** rather than matching energy consumption data to RDD-sampled households**.**

➡ ***Conclusion 5:*** **The use of behavioral and attitudinal variables was effective in identifying segments.** The largest change in survey questions for the 2009 sample was to expand the questions addressing behavioral and attitudinal variables. This proved to be a more effective basis for the segmentation analysis and was especially valuable due to the lack of billing data.

Recommendation 5: **Continue to use behavioral and attitudinal questions in surveys that will be used for segmentation analysis**. These questions can be refined further and perhaps expanded to further account for drivers in customer decision-making about energy efficiency.

APPENDICES

A FINAL SURVEY DISPOSITIONS

FIRST PHASE INTERVIEWS

DISPOSITION	COUNT	PERCENT
No Answer	1,999	12.6%
Answering Machine	2,239	14.1%
Busy	251	1.6%
Disconnected Phone	4,462	28.2%
Business/Residential Phone (ADJUST)	668	4.2%
Initial Refusal	966	6.1%
Computer Tone	537	3.4%
Language Problems	482	3.0%
RESPONDENT SCHEDULED APPOINTMENT	126	0.8%
Non-Specific Callback / Secretary / NTG	1,711	10.8%
Completed Interview	903	5.7%
Mid-Interview Terminate	61	0.4%
Enter a Substitute Phone Number	0	0.0%
Duplicate Phone Number	13	0.1%
Privacy Line/Number Blocked	671	4.2%
Wrong Number	25	0.2%
HARD REFUSAL – DO NOT CALL	402	2.5%
Cell Phone / Refused to Do Survey Because It's a Cell Phone	3	0.0%
Not Responsible for Decisions	30	0.2%
Location Is Not a Residence	9	0.1%
Employee of an Electric or Gas Utility Company	21	0.1%
Does Not Own/Rent Home	87	0.5%
DID NOT PROVIDE ZIP CODE	0	0.0%
DID NOT PROVIDE HOUSING TYPE	0	0.0%
DID NOT PROVIDE AGE	10	0.1%
OVER QUOTA	157	1.0%

SECOND PHASE INTERVIEWS

DISPOSITION	COUNT	PERCENT
No Answer	746	15.2%
Answering Machine	523	10.7%
Busy	95	1.9%
Disconnected Phone	1,070	21.8%
Business/Residential Phone (ADJUST)	103	2.1%
Initial Refusal	170	3.5%
Computer Tone	122	2.5%
Language Problems	180	3.7%
RESPONDENT SCHEDULED APPOINTMENT	8	0.2%
Non-Specific Callback / Secretary / NTG	1,116	22.8%
Completed Interview	127	2.6%
Mid-Interview Terminate	7	0.1%
Enter a Substitute Phone Number	0	0.0%
Duplicate Phone Number	2	0.0%
Privacy Line/Number Blocked	430	8.8%
Wrong Number	3	0.1%
HARD REFUSAL – DO NOT CALL	8	0.2%
Cell Phone / Refused to Do Survey Because It's a Cell Phone	3	0.1%
Not Responsible for Decisions	9	0.2%
Location Is Not a Residence	1	0.0%
Employee of an Electric or Gas Utility Company	2	0.0%
Does Not Own/Rent Home	7	0.1%
DID NOT PROVIDE ZIP CODE	0	0.0%
DID NOT PROVIDE HOUSING TYPE	0	0.0%
DID NOT PROVIDE AGE	0	0.0%
OVER QUOTA	173	3.5%

B ZIP CODE BREAKOUTS

ZIP CODE	TOWN	COUNTY	REGION
97001	Antelope	Wasco	Eastern Oregon
97002	Aurora	Marion	Willamette / North Coast
97004	Beaver Creek	Clackamas	Portland Metro
97005	Beaverton	Washington	Portland Metro
97006	Beaverton	Washington	Portland Metro
97007	Beaverton	Washington	Portland Metro
97008	Beaverton	Washington	Portland Metro
97009	Boring	Clackamas	Portland Metro
97010	Bridal Veil	Multnomah	Portland Metro
97011	Brightwood	Clackamas	Portland Metro
97012	Canby	Clackamas	Portland Metro
97013	Canby	Clackamas	Portland Metro
97014	Cascade Locks	Hood River	Eastern Oregon
97015	Clackamas	Clackamas	Portland Metro
97016	Clatskanie	Columbia	Portland Metro
97017	Colton	Clackamas	Portland Metro
97018	Columbia City	Columbia	Portland Metro
97019	Corbett	Multnomah	Portland Metro
97020	Donald	Marion	Willamette / North Coast
97021	Dufur	Wasco	Eastern Oregon
97022	Eagle Creek	Clackamas	Portland Metro
97023	Estacada	Clackamas	Portland Metro
97024	Fairview	Coos	Southern Oregon
97025	Lake Oswego	Clackamas	Portland Metro
97026	Gervais	Marion	Willamette / North Coast
97027	Gladstone	Clackamas	Portland Metro
97028	Government Camp	Clackamas	Portland Metro
97029	Grass Valley	Sherman	Eastern Oregon

Continued

ZIP CODE	TOWN	COUNTY	REGION
97030	Gresham	Multnomah	Portland Metro
97031	Hood River	Hood River	Eastern Oregon
97032	Hubbard	Marion	Willamette / North Coast
97033	Kent	Sherman	Eastern Oregon
97034	Lake Oswego	Clackamas	Portland Metro
97035	Lake Oswego	Clackamas	Portland Metro
97036	Marylhurst	Clackamas	Portland Metro
97037	Maupin	Wasco	Eastern Oregon
97038	Molalla	Clackamas	Portland Metro
97039	Moro	Sherman	Eastern Oregon
97040	Mosier	Wasco	Eastern Oregon
97041	Mount Hood Parkdale	Hood River	Eastern Oregon
97042	Mulino	Clackamas	Portland Metro
97044	Odell	Hood River	Eastern Oregon
97045	Oregon City	Clackamas	Portland Metro
97047	Parkdale	Hood River	Eastern Oregon
97048	Rainier	Columbia	Portland Metro
97049	Rhododendron	Clackamas	Portland Metro
97050	Rufus	Sherman	Eastern Oregon
97051	Saint Helens	Columbia	Portland Metro
97053	Warren	Columbia	Portland Metro
97054	Deer Island	Columbia	Portland Metro
97055	Sandy	Clackamas	Portland Metro
97056	Scappoose	Columbia	Portland Metro
97057	Shaniko	Wasco	Eastern Oregon
97058	The Dalles	Wasco	Eastern Oregon
97060	Troutdale	Multnomah	Portland Metro
97061	Clatskanie	Columbia	Portland Metro
97062	Tualatin	Washington	Portland Metro
97063	Tygh Valley	Wasco	Eastern Oregon
97064	Vernonia	Columbia	Portland Metro
97065	Wasco	Sherman	Eastern Oregon
97066	Scappoose	Columbia	Portland Metro

Continued

ZIP CODE	TOWN	COUNTY	REGION
97067	Welches	Clackamas	Portland Metro
97068	West Linn	Clackamas	Portland Metro
97069	West Linn	Clackamas	Portland Metro
97070	Wilsonville	Clackamas	Portland Metro
97071	Woodburn	Marion	Willamette / North Coast
97072	Hubbard	Marion	Willamette / North Coast
97073	Faubion	Clackamas	Portland Metro
97074	South Junction	Wasco	Eastern Oregon
97075	Beaverton	Washington	Portland Metro
97076	Beaverton	Washington	Portland Metro
97077	Beaverton	Washington	Portland Metro
97078	Beaverton	Washington	Portland Metro
97080	Gresham	Multnomah	Portland Metro
97086	Columbia County	Columbia	Portland Metro
97088	Gresham	Multnomah	Portland Metro
97100	Indeterminate (Washington)	Washington	Portland Metro
97101	Amity	Yamhill	Willamette / North Coast
97102	Arch Cape	Clatsop	Willamette / North Coast
97103	Astoria	Clatsop	Willamette / North Coast
97106	Banks	Washington	Portland Metro
97107	Bay City	Tillamook	Willamette / North Coast
97108	Beaver	Tillamook	Willamette / North Coast
97109	Buxton	Washington	Portland Metro
97110	Cannon Beach	Clatsop	Willamette / North Coast
97111	Carlton	Yamhill	Willamette / North Coast
97112	Cloverdale	Deschutes	Eastern Oregon
97113	Cornelius	Washington	Portland Metro
97114	Dayton	Yamhill	Willamette / North Coast
97115	Dundee	Yamhill	Willamette / North Coast
97116	Forest Grove	Washington	Portland Metro
97117	Gales Creek	Washington	Portland Metro
97118	Garibaldi	Tillamook	Willamette / North Coast
97119	Gaston	Washington	Portland Metro

Continued

ZIP CODE	TOWN	COUNTY	REGION
97121	Hammond	Clatsop	Willamette / North Coast
97122	Hebo	Tillamook	Willamette / North Coast
97123	Hillsboro	Washington	Portland Metro
97124	Hillsboro	Washington	Portland Metro
97125	Manning	Washington	Portland Metro
97126	McMinville	Yamhill	Willamette / North Coast
97127	Lafayette	Yamhill	Willamette / North Coast
97128	Mcminnville	Yamhill	Willamette / North Coast
97130	Manzanita	Tillamook	Willamette / North Coast
97131	Nehalem	Tillamook	Willamette / North Coast
97132	Newberg	Yamhill	Willamette / North Coast
97133	North Plains	Washington	Portland Metro
97134	Oceanside	Tillamook	Willamette / North Coast
97135	Pacific City	Tillamook	Willamette / North Coast
97136	Rockaway Beach	Tillamook	Willamette / North Coast
97137	Saint Paul	Marion	Willamette / North Coast
97138	Seaside	Clatsop	Willamette / North Coast
97140	Sherwood	Washington	Portland Metro
97141	Tillamook	Tillamook	Willamette / North Coast
97142	Indeterminate (Washington)	Washington	Portland Metro
97143	Netarts	Tillamook	Willamette / North Coast
97144	Timber	Washington	Portland Metro
97145	Tolovana Park	Clatsop	Willamette / North Coast
97146	Warrenton	Clatsop	Willamette / North Coast
97147	Wheeler	Tillamook	Willamette / North Coast
97148	Yamhill	Yamhill	Willamette / North Coast
97149	Neskowin	Tillamook	Willamette / North Coast
97173	Washington County	Washington	Portland Metro
97200	Portland	Multnomah	Portland Metro
97201	Portland	Multnomah	Portland Metro
97202	Portland	Multnomah	Portland Metro
97203	Portland	Multnomah	Portland Metro
97204	Portland	Multnomah	Portland Metro

Continued

ZIP CODE	TOWN	COUNTY	REGION
97205	Portland	Multnomah	Portland Metro
97206	Portland	Multnomah	Portland Metro
97207	Portland	Multnomah	Portland Metro
97208	Portland	Multnomah	Portland Metro
97209	Portland	Multnomah	Portland Metro
97210	Portland	Multnomah	Portland Metro
97211	Portland	Multnomah	Portland Metro
97212	Portland	Multnomah	Portland Metro
97213	Portland	Multnomah	Portland Metro
97214	Portland	Multnomah	Portland Metro
97215	Portland	Multnomah	Portland Metro
97216	Portland	Multnomah	Portland Metro
97217	Portland	Multnomah	Portland Metro
97218	Portland	Multnomah	Portland Metro
97219	Portland	Multnomah	Portland Metro
97220	Portland	Multnomah	Portland Metro
97221	Portland	Multnomah	Portland Metro
97222	Milwaukie	Clackamas	Portland Metro
97223	Tigard	Washington	Portland Metro
97224	Tigard	Washington	Portland Metro
97225	Cedar Mill	Washington	Portland Metro
97226	Portland	Multnomah	Portland Metro
97227	Portland	Multnomah	Portland Metro
97228	Portland	Multnomah	Portland Metro
97229	Cedar Mill	Washington	Portland Metro
97230	Portland	Multnomah	Portland Metro
97231	Portland	Multnomah	Portland Metro
97232	Portland	Multnomah	Portland Metro
97233	Portland	Multnomah	Portland Metro
97235	Lake Oswego	Clackamas	Portland Metro
97236	Portland	Multnomah	Portland Metro
97237	Portland	Multnomah	Portland Metro
97238	Portland	Multnomah	Portland Metro

Continued

ZIP CODE	TOWN	COUNTY	REGION
97239	Portland	Multnomah	Portland Metro
97240	Portland	Multnomah	Portland Metro
97242	Portland	Multnomah	Portland Metro
97246	Portland	Multnomah	Portland Metro
97250	Portland	Multnomah	Portland Metro
97251	Portland	Multnomah	Portland Metro
97253	Portland	Multnomah	Portland Metro
97254	Portland	Multnomah	Portland Metro
97255	Portland	Multnomah	Portland Metro
97256	Portland	Multnomah	Portland Metro
97258	Portland	Multnomah	Portland Metro
97259	Portland	Multnomah	Portland Metro
97262	Indeterminate (Multnomah)	Multnomah	Portland Metro
97264	Portland	Multnomah	Portland Metro
97265	Portland	Multnomah	Portland Metro
97266	Town Center	Clackamas	Portland Metro
97267	Oak Lodge	Clackamas	Portland Metro
97268	Portland	Multnomah	Portland Metro
97269	Portland	Multnomah	Portland Metro
97271	Portland	Multnomah	Portland Metro
97272	Portland	Multnomah	Portland Metro
97276	Portland	Multnomah	Portland Metro
97280	Portland	Multnomah	Portland Metro
97281	Portland (Wash. Co.)	Washington	Portland Metro
97282	Portland	Multnomah	Portland Metro
97283	Portland	Multnomah	Portland Metro
97286	Portland	Multnomah	Portland Metro
97289	Portland	Multnomah	Portland Metro
97290	Portland	Multnomah	Portland Metro
97291	Portland (Wash. Co.)	Washington	Portland Metro
97292	Portland	Multnomah	Portland Metro
97293	Portland	Multnomah	Portland Metro
97294	Portland	Multnomah	Portland Metro

Continued

ZIP CODE	TOWN	COUNTY	REGION
97296	Portland	Multnomah	Portland Metro
97298	West Slope	Washington	Portland Metro
97299	Portland	Multnomah	Portland Metro
97301	Salem	Marion	Willamette / North Coast
97302	Salem	Marion	Willamette / North Coast
97303	Salem	Marion	Willamette / North Coast
97304	Salem	Marion	Willamette / North Coast
97305	Salem	Marion	Willamette / North Coast
97306	Salem	Marion	Willamette / North Coast
97307	Keizer	Marion	Willamette / North Coast
97308	Salem	Marion	Willamette / North Coast
97309	Salem	Marion	Willamette / North Coast
97310	Salem	Marion	Willamette / North Coast
97311	Salem	Marion	Willamette / North Coast
97312	Salem	Marion	Willamette / North Coast
97313	Salem	Marion	Willamette / North Coast
97314	Salem	Marion	Willamette / North Coast
97318	Seaside	Clatsop	Willamette / North Coast
97320	Albany	Linn	Willamette / North Coast
97321	Albany	Linn	Willamette / North Coast
97322	Albany	Linn	Willamette / North Coast
97324	Alsea	Benton	Willamette / North Coast
97325	Aumsville	Marion	Willamette / North Coast
97326	Blodgett	Benton	Willamette / North Coast
97327	Brownsville	Linn	Willamette / North Coast
97328	Monmouth	Polk	Willamette / North Coast
97329	Cascadia	Linn	Willamette / North Coast
97330	Corvallis	Benton	Willamette / North Coast
97331	Corvallis	Benton	Willamette / North Coast
97332	Corvallis	Benton	Willamette / North Coast
97333	Corvallis	Benton	Willamette / North Coast
97335	Crabtree	Linn	Willamette / North Coast
97336	Crawfordsville	Linn	Willamette / North Coast

Continued

ZIP CODE	TOWN	COUNTY	REGION
97338	Dallas	Polk	Willamette / North Coast
97339	Corvallis	Benton	Willamette / North Coast
97341	Depoe Bay	Lincoln	Willamette / North Coast
97342	Detroit	Marion	Willamette / North Coast
97343	Eddyville	Lincoln	Willamette / North Coast
97344	Falls City	Polk	Willamette / North Coast
97345	Foster	Linn	Willamette / North Coast
97346	Gates	Linn	Willamette / North Coast
97347	Grand Ronde	Polk	Willamette / North Coast
97348	Halsey	Linn	Willamette / North Coast
97350	Idanha	Linn	Willamette / North Coast
97351	Independence	Polk	Willamette / North Coast
97352	Jefferson	Marion	Willamette / North Coast
97355	Lebanon	Linn	Willamette / North Coast
97356	Newport	Lincoln	Willamette / North Coast
97357	Logsden	Lincoln	Willamette / North Coast
97358	Lyons	Linn	Willamette / North Coast
97359	Marion	Marion	Willamette / North Coast
97360	Mill City	Linn	Willamette / North Coast
97361	Monmouth	Polk	Willamette / North Coast
97362	Mount Angel	Marion	Willamette / North Coast
97364	Neotsu	Lincoln	Willamette / North Coast
97365	Newport	Lincoln	Willamette / North Coast
97366	South Beach	Lincoln	Willamette / North Coast
97367	Lincoln City	Lincoln	Willamette / North Coast
97368	Otis	Lincoln	Willamette / North Coast
97369	Otter Rock	Lincoln	Willamette / North Coast
97370	Philomath	Benton	Willamette / North Coast
97371	Rickreall	Polk	Willamette / North Coast
97372	Rose Lodge	Lincoln	Willamette / North Coast
97373	Saint Benedict	Marion	Willamette / North Coast
97374	Scio	Linn	Willamette / North Coast
97375	Scotts Mills	Marion	Willamette / North Coast

Continued

ZIP CODE	TOWN	COUNTY	REGION
97376	Seal Rock	Lincoln	Willamette / North Coast
97377	Shedd	Linn	Willamette / North Coast
97378	Sheridan	Yamhill	Willamette / North Coast
97380	Siletz	Lincoln	Willamette / North Coast
97381	Silverton	Marion	Willamette / North Coast
97383	Stayton	Marion	Willamette / North Coast
97384	Mehama	Marion	Willamette / North Coast
97385	Sublimity	Marion	Willamette / North Coast
97386	Sweet Home	Linn	Willamette / North Coast
97388	Gleneden Beach	Lincoln	Willamette / North Coast
97389	Tangent	Linn	Willamette / North Coast
97390	Tidewater	Lincoln	Willamette / North Coast
97391	Toledo	Lincoln	Willamette / North Coast
97392	Turner	Marion	Willamette / North Coast
97394	Waldport	Lincoln	Willamette / North Coast
97396	Willamina	Polk	Willamette / North Coast
97400	Indeterminate (Lane)	Lane	Willamette / North Coast
97401	Eugene	Lane	Willamette / North Coast
97402	Eugene	Lane	Willamette / North Coast
97403	Eugene	Lane	Willamette / North Coast
97404	Eugene	Lane	Willamette / North Coast
97405	Eugene	Lane	Willamette / North Coast
97406	Agness	Curry	Southern Oregon
97407	Allegany	Coos	Southern Oregon
97408	Eugene	Lane	Willamette / North Coast
97409	Alvadore	Lane	Willamette / North Coast
97410	Azalea	Douglas	Southern Oregon
97411	Bandon	Coos	Southern Oregon
97412	Blachly	Lane	Willamette / North Coast
97413	Blue River	Lane	Willamette / North Coast
97414	Broadbent	Coos	Southern Oregon
97415	Brookings	Curry	Southern Oregon
97416	Camas Valley	Douglas	Southern Oregon

Continued

ZIP CODE	TOWN	COUNTY	REGION
97417	Canyonville	Douglas	Southern Oregon
97418	Junction City	Lane	Willamette / North Coast
97419	Cheshire	Lane	Willamette / North Coast
97420	Coos Bay	Coos	Southern Oregon
97421	Coos Bay	Coos	Southern Oregon
97422	Douglas County	Douglas	Southern Oregon
97423	Coquille	Coos	Southern Oregon
97424	Cottage Grove	Lane	Willamette / North Coast
97425	Crescent Lake	Klamath	Eastern Oregon
97426	Creswell	Lane	Willamette / North Coast
97427	Culp Creek	Lane	Willamette / North Coast
97428	Curtin	Douglas	Southern Oregon
97429	Days Creek	Douglas	Southern Oregon
97430	Deadwood	Lane	Willamette / North Coast
97431	Dexter	Lane	Willamette / North Coast
97432	Dillard	Douglas	Southern Oregon
97434	Dorena	Lane	Willamette / North Coast
97435	Drain	Douglas	Southern Oregon
97436	Elkton	Douglas	Southern Oregon
97437	Elmira	Lane	Willamette / North Coast
97438	Fall Creek	Lane	Willamette / North Coast
97439	Florence	Lane	Willamette / North Coast
97440	Eugene	Lane	Willamette / North Coast
97441	Gardiner	Douglas	Southern Oregon
97442	Glendale	Douglas	Southern Oregon
97443	Glide	Douglas	Southern Oregon
97444	Gold Beach	Curry	Southern Oregon
97446	Harrisburg	Linn	Willamette / North Coast
97447	Idleyld Park	Douglas	Southern Oregon
97448	Junction City	Lane	Willamette / North Coast
97449	Lakeside	Coos	Southern Oregon
97450	Langlois	Curry	Southern Oregon
97451	Lorane	Lane	Willamette / North Coast

Continued

ZIP CODE	TOWN	COUNTY	REGION
97452	Lowell	Lane	Willamette / North Coast
97453	Mapleton	Lane	Willamette / North Coast
97454	Marcola	Lane	Willamette / North Coast
97455	Pleasant Hill	Lane	Willamette / North Coast
97456	Monroe	Benton	Willamette / North Coast
97457	Myrtle Creek	Douglas	Southern Oregon
97458	Myrtle Point	Coos	Southern Oregon
97459	North Bend	Coos	Southern Oregon
97460	Norway	Coos	Southern Oregon
97461	Noti	Lane	Willamette / North Coast
97462	Oakland	Douglas	Southern Oregon
97463	Oakridge	Lane	Willamette / North Coast
97464	Ophir	Curry	Southern Oregon
97465	Port Orford	Curry	Southern Oregon
97466	Powers	Coos	Southern Oregon
97467	Reedsport	Douglas	Southern Oregon
97468	Remote	Coos	Southern Oregon
97469	Riddle	Douglas	Southern Oregon
97470	Roseburg	Douglas	Southern Oregon
97472	Saginaw	Lane	Willamette / North Coast
97473	Scottsburg	Douglas	Southern Oregon
97476	Sixes	Curry	Southern Oregon
97477	Springfield	Lane	Willamette / North Coast
97478	Springfield	Lane	Willamette / North Coast
97479	Sutherlin	Douglas	Southern Oregon
97480	Swisshome	Lane	Willamette / North Coast
97481	Tenmile	Douglas	Southern Oregon
97482	Thurston	Lane	Willamette / North Coast
97484	Tiller	Douglas	Southern Oregon
97486	Umpqua	Douglas	Southern Oregon
97487	Veneta	Lane	Willamette / North Coast
97488	Vida	Lane	Willamette / North Coast
97489	Walterville	Lane	Willamette / North Coast

Continued

ZIP CODE	TOWN	COUNTY	REGION
97490	Walton	Lane	Willamette / North Coast
97491	Wedderburn	Curry	Southern Oregon
97492	Westfir	Lane	Willamette / North Coast
97493	Westlake	Lane	Willamette / North Coast
97494	Wilbur	Douglas	Southern Oregon
97495	Winchester	Douglas	Southern Oregon
97496	Winston	Douglas	Southern Oregon
97497	Wolf Creek	Josephine	Southern Oregon
97498	Yachats	Lincoln	Willamette / North Coast
97499	Yoncalla	Douglas	Southern Oregon
97500	Indeterminate (Jackson)	Jackson	Eastern Oregon
97501	Medford	Jackson	Eastern Oregon
97502	Central Point	Jackson	Eastern Oregon
97503	White City	Jackson	Eastern Oregon
97504	Medford	Jackson	Eastern Oregon
97505	Indeterminate (Jackson)	Jackson	Eastern Oregon
97520	Ashland	Jackson	Eastern Oregon
97521	Ashland	Jackson	Eastern Oregon
97522	Butte Falls	Jackson	Eastern Oregon
97523	Cave Junction	Josephine	Southern Oregon
97524	Eagle Point	Jackson	Eastern Oregon
97525	Gold Hill	Jackson	Eastern Oregon
97526	Grants Pass	Josephine	Southern Oregon
97527	Grants Pass	Josephine	Southern Oregon
97528	Grants Pass	Josephine	Southern Oregon
97529	Central Point	Jackson	Eastern Oregon
97530	Jacksonville	Jackson	Eastern Oregon
97531	Kerby	Josephine	Southern Oregon
97532	Merlin	Josephine	Southern Oregon
97533	Murphy	Josephine	Southern Oregon
97534	O'Brien	Josephine	Southern Oregon
97535	Phoenix	Jackson	Eastern Oregon
97536	Prospect	Jackson	Eastern Oregon

Continued

ZIP CODE	TOWN	COUNTY	REGION
97537	Rogue River	Jackson	Eastern Oregon
97538	Selma	Josephine	Southern Oregon
97539	Shady Cove	Jackson	Eastern Oregon
97540	Talent	Jackson	Eastern Oregon
97541	Trail	Jackson	Eastern Oregon
97543	Wilderville	Josephine	Southern Oregon
97544	Williams	Josephine	Southern Oregon
97545	Josephine County	Josephine	Southern Oregon
97555	Prineville	Crook	Eastern Oregon
97558	Crater Lake	Klamath	Eastern Oregon
97562	Grants Pass	Josephine	Southern Oregon
97565	Port Orford	Curry	Southern Oregon
97586	Grants Pass	Josephine	Southern Oregon
97601	Klamath Falls	Klamath	Eastern Oregon
97602	Klamath Falls	Klamath	Eastern Oregon
97603	Klamath Falls	Klamath	Eastern Oregon
97604	Crater Lake	Klamath	Eastern Oregon
97607	Klamath Falls	Klamath	Eastern Oregon
97620	Adel	Lake	Eastern Oregon
97621	Beatty	Klamath	Eastern Oregon
97622	Bly	Klamath	Eastern Oregon
97623	Bonanza	Klamath	Eastern Oregon
97624	Chiloquin	Klamath	Eastern Oregon
97625	Dairy	Klamath	Eastern Oregon
97626	Fort Klamath	Klamath	Eastern Oregon
97627	Keno	Klamath	Eastern Oregon
97630	Lakeview	Lake	Eastern Oregon
97632	Malin	Klamath	Eastern Oregon
97633	Merrill	Klamath	Eastern Oregon
97634	Midland	Klamath	Eastern Oregon
97635	New Pine Creek	Lake	Eastern Oregon
97636	Paisley	Lake	Eastern Oregon
97637	Plush	Lake	Eastern Oregon

Continued

ZIP CODE	TOWN	COUNTY	REGION
97638	Silver Lake	Lake	Eastern Oregon
97639	Sprague River	Klamath	Eastern Oregon
97640	Summer Lake	Lake	Eastern Oregon
97641	Christmas Valley	Lake	Eastern Oregon
97642	Rice Hill	Douglas	Southern Oregon
97654	Deer Island	Columbia	Portland Metro
97701	Bend	Deschutes	Eastern Oregon
97702	Bend	Deschutes	Eastern Oregon
97705	Bend	Deschutes	Eastern Oregon
97706	Beaverton	Washington	Portland Metro
97707	Bend	Deschutes	Eastern Oregon
97708	Bend	Deschutes	Eastern Oregon
97709	Bend	Deschutes	Eastern Oregon
97710	Fields	Harney	Eastern Oregon
97711	Ashwood	Jefferson	Eastern Oregon
97712	Brothers	Deschutes	Eastern Oregon
97720	Burns	Harney	Eastern Oregon
97721	Princeton	Harney	Eastern Oregon
97722	Diamond	Harney	Eastern Oregon
97730	Camp Sherman	Jefferson	Eastern Oregon
97731	Chemult	Klamath	Eastern Oregon
97732	Crane	Harney	Eastern Oregon
97733	Crescent	Klamath	Eastern Oregon
97734	Culver	Jefferson	Eastern Oregon
97735	Fort Rock	Lake	Eastern Oregon
97736	Frenchglen	Harney	Eastern Oregon
97737	Gilchrist	Klamath	Eastern Oregon
97738	Hines	Harney	Eastern Oregon
97739	La Pine	Deschutes	Eastern Oregon
97740	Lawen	Harney	Eastern Oregon
97741	Madras	Jefferson	Eastern Oregon
97750	Mitchell	Wheeler	Eastern Oregon
97751	Paulina	Crook	Eastern Oregon

Continued

ZIP CODE	TOWN	COUNTY	REGION
97752	Post	Crook	Eastern Oregon
97753	Powell Butte	Crook	Eastern Oregon
97754	Prineville	Crook	Eastern Oregon
97756	Redmond	Deschutes	Eastern Oregon
97758	Riley	Harney	Eastern Oregon
97759	Sisters	Deschutes	Eastern Oregon
97760	Terrebonne	Deschutes	Eastern Oregon
97761	Warm Springs	Jefferson	Eastern Oregon
97764	Indeterminate (Jefferson)	Jefferson	Eastern Oregon
97782	Umatilla	Umatilla	Eastern Oregon
97801	Pendleton	Umatilla	Eastern Oregon
97810	Adams	Benton	Willamette / North Coast
97812	Arlington	Gilliam	Eastern Oregon
97813	Athena	Umatilla	Eastern Oregon
97814	Baker City	Baker	Eastern Oregon
97817	Bates	Grant	Eastern Oregon
97818	Boardman	Morrow	Eastern Oregon
97819	Bridgeport	Baker	Eastern Oregon
97820	Canyon City	Grant	Eastern Oregon
97821	Cayuse	Umatilla	Eastern Oregon
97823	Condon	Gilliam	Eastern Oregon
97824	Cove	Union	Eastern Oregon
97825	Dayville	Grant	Eastern Oregon
97826	Echo	Umatilla	Eastern Oregon
97827	Elgin	Union	Eastern Oregon
97828	Enterprise	Wallowa	Eastern Oregon
97830	Fossil	Wheeler	Eastern Oregon
97831	Fox	Grant	Eastern Oregon
97832	Condon	Gilliam	Eastern Oregon
97833	Haines	Baker	Eastern Oregon
97834	Halfway	Baker	Eastern Oregon
97835	Helix	Umatilla	Eastern Oregon
97836	Heppner	Morrow	Eastern Oregon

Continued

ZIP CODE	TOWN	COUNTY	REGION
97837	Hereford	Baker	Eastern Oregon
97838	Hermiston	Umatilla	Eastern Oregon
97839	Lexington	Morrow	Eastern Oregon
97840	Oxbow	Baker	Eastern Oregon
97841	Imbler	Union	Eastern Oregon
97842	Imnaha	Wallowa	Eastern Oregon
97843	Ione	Morrow	Eastern Oregon
97844	Irrigon	Morrow	Eastern Oregon
97845	John Day	Grant	Eastern Oregon
97846	Joseph	Wallowa	Eastern Oregon
97848	Kimberly	Grant	Eastern Oregon
97850	La Grande	Union	Eastern Oregon
97852	Milton-Freewater	Umatilla	Eastern Oregon
97856	Long Creek	Grant	Eastern Oregon
97857	Lostine	Wallowa	Eastern Oregon
97858	Enterprise	Wallowa	Eastern Oregon
97859	Meacham	Umatilla	Eastern Oregon
97860	Indeterminate (Gilliam)	Gilliam	Eastern Oregon
97861	Mikkalo	Gilliam	Eastern Oregon
97862	Milton-Freewater	Umatilla	Eastern Oregon
97864	Monument	Grant	Eastern Oregon
97865	Mount Vernon	Grant	Eastern Oregon
97866	Prairie City	Grant	Eastern Oregon
97867	North Powder	Union	Eastern Oregon
97868	Pilot Rock	Umatilla	Eastern Oregon
97869	Prairie City	Grant	Eastern Oregon
97870	Richland	Baker	Eastern Oregon
97872	Ritter	Grant	Eastern Oregon
97873	Seneca	Grant	Eastern Oregon
97874	Spray	Wheeler	Eastern Oregon
97875	Stanfield	Umatilla	Eastern Oregon
97876	Summerville	Union	Eastern Oregon
97877	Sumpter	Baker	Eastern Oregon

Continued

ZIP CODE	TOWN	COUNTY	REGION
97878	Hermiston	Umatilla	Eastern Oregon
97880	Ukiah	Umatilla	Eastern Oregon
97882	Umatilla	Umatilla	Eastern Oregon
97883	Union	Union	Eastern Oregon
97884	Unity	Baker	Eastern Oregon
97885	Wallowa	Wallowa	Eastern Oregon
97886	Weston	Umatilla	Eastern Oregon
97890	Indeterminate (Malheur)	Malheur	Eastern Oregon
97901	Adrian	Malheur	Eastern Oregon
97902	Arock	Malheur	Eastern Oregon
97903	Brogan	Malheur	Eastern Oregon
97904	Drewsey	Harney	Eastern Oregon
97905	Durkee	Baker	Eastern Oregon
97906	Harper	Malheur	Eastern Oregon
97907	Huntington	Baker	Eastern Oregon
97908	Ironside	Malheur	Eastern Oregon
97909	Jamieson	Malheur	Eastern Oregon
97910	Jordan Valley	Malheur	Eastern Oregon
97911	Juntura	Malheur	Eastern Oregon
97913	Nyssa	Malheur	Eastern Oregon
97914	Ontario	Malheur	Eastern Oregon
97917	Riverside	Linn	Willamette / North Coast
97918	Vale	Malheur	Eastern Oregon
97920	Westfall	Malheur	Eastern Oregon

C LIMITATIONS

MISSING DATA

The 2009 segmentation, discussed in the body of this report, must be interpreted carefully. Our primary concern relates to missing data. Specifically, complete energy consumption billing data were available for just 252 of the 904 respondents interviewed for this study. Furthermore, of those 252 cases, only 203 were included in the energy consumption regression model (see Appendix D). We input the significant predictors of this energy consumption regression model into a segmentation algorithm, which allowed us to identify the segments described earlier in this report. Since information based on only 203 cases determined the significant predictors of the energy consumption regression model and in turn influenced the segmentation solution, it is possible that this segmentation profile may not be optimal due to the large amount of missing data in the regression model.

D ANALYSIS METHOD

FACTOR ANALYSIS

Factor analysis is a statistical method that uses a regression line to represent the "best" fit of the linear relationship between two or more variables. By using factor analysis, we were able to reduce the number of variables in the 2009 dataset and identify five broad factors (Table D.2 and Table D.3). The relationships between the variables and the factor generally had medium to high loading scores, between 0.50 and 0.97. The loading scores, or correlations, were calculated based on the shared variance among all the variables, instead of the total variance. The *shared variance* is the *observed variance* (what is measured), whereas the *total variance* consists of the *observed* and the *unobserved variance*. The unobserved variance is the error term in factor analysis. Hence, by examining the shared variance among all the variables, we could explore the observed relationships while separating the error term.

We identified the appropriate factor-based structure in the dataset, based on the following model specifications. We chose the scree plot for the optimal number of factors as the rationale for the number of factors in the dataset per Costello and Osborne.[13] We chose the varimax rotation to specify the relationships between the factors. We assumed that factors in the dataset were uncorrelated. This was appropriate, since the results from the varimax rotation did not differ from the results of the rotation that assumed correlated factors. Finally, we chose loading factor scores above 0.4, because anything below 0.4 often is too small to provide any meaningful information (see Costello and Osborne, and Tabachnick and Fidell).[14] These choices determined the final structure of the factor model for the dataset.

REGRESSION

We used the regression analysis to identify the significant predictors of energy consumption and consumers' willingness to install infrequent energy efficiency measures.

The dependent variable for the regression model on energy consumption was the annual energy use per household, which was a sum of gas and electricity usage in BTUs. The number of relevant infrequent energy efficiency measures done in the last 12 months (Table D.1) was the dependent variable for the regression model assessing consumers' willingness to adopt such

---

13 Costello, A. B., and J.W. Osborne. 2005. "Best Practices In Exploratory Factor Analysis: Four Recommendations for Getting the Most from Your Analysis." Practical Assessment, Research & Evaluation 10 (7): 1-9. See: *http://pareonline.net/pdf/v10n7.pdf.*

14 Tabachnick, B. G. and L. S. Fidell. 2001. *Using Multivariate Statistics*, Fourth Edition. Needham Heights, Mass.: Allyn & Bacon.

measures. The independent variables in both models were energy perceptions, energy attitudes, energy efficiency or renewable energy awareness, information access, housing characteristics, and household characteristics (Table D.2).

Table D.1: Infrequent Actions Respondents Mentioned Doing to Reduce Energy Use In Their Home

ACTION
Added Insulation
Installed New Efficient Windows
Performed Weatherization – Caulking or Weather Stripping
Installed Heating/Cooling System Upgrade
Changed Water Heater Temperature – Lowered the Thermostat Setting
Installed Water Heater System Upgrade
Purchased Efficient Appliances
Installed CFLs (More than 5)
Installed Solar/Alternate Power

We input the independent variables that represented energy perceptions or attitudes into a regression model as factors. These factors were constructs measuring a specific domain and they were identified in the factor analysis. Thus, we entered the independent variables that were factors from the factor analysis into a regression model as an average score of all the variables that represented a factor. The reliability statistics indicated that the average of multiple items that loaded in each factor reliably measured the constructs that the factors represented. (Cronbach alpha values were between 0.6 and 0.7 for all the factors; see Table D.2 and Table D.3.) Some variables comprising a factor had different scales. In those instances, we standardized the scales of all the variables in a factor by computing the z-scores of the relevant variables, and then averaged them.

The regression models were based on Ordinary Least Squares estimation. Variables were entered simultaneously in the energy consumption regression model and stepwise in the model assessing the adoption of infrequent energy efficiency measures. The stepwise model was based on forward selection: starting with no variables, and then assessing variables one-by-one and including those that were statistically significant. For both models, we used the listwise deletion to identify missing data.

SEGMENTATION

Factor analysis and the regression procedures were necessary to identify an optimal set of variables and factors for the final two-step cluster analysis. This was important because the choice of variables determines the cluster solution. We used factor analysis to identify larger dimensions, so we could input a smaller set of variables in a regression model. We used regression analysis to identify the significant predictors of energy-related behaviors (energy

consumption and willingness to adopt infrequent energy efficiency measures). The two-step cluster approach was the most appropriate choice over other segmentation algorithms because it properly accounted for binary/categorical data and a large number of cases.

The final cluster solution was a result of the Schwarz Bayesian Criterion (BIC) and the Ratio of Distance Measures (RDM). BIC and RDM allowed us to determine the optimal cluster model by analyzing the amount of additional variation explained at each step of the iterative process regarding cluster formation (going from cluster 1 solution to cluster 2 solution, and so on). The optimal fit was at the BIC level that had a decreasing RDM. This was the point at which we could not explain much more variance if we were to continue with the next cluster solution.

The final cluster solution, based on the significant variables from the energy consumption regression model, resulted in six clusters, while the solution based on the infrequent energy efficiency behavior contained five.

After choosing the final segmentation solutions, we analyzed the crosstabs of the derived segments and other variables (typically demographic variables) to clarify the characteristics of the segments.

INTERPRETATION

Factor Analysis

The result of the factor analysis is shown in Table D.2 and Table D.3. The results indicate five main factors or dimensions – perceived efficacy of energy efficiency actions for mitigating environmental impacts, energy concerns, pro-saving energy attitudes, anti-saving energy attitudes, and Internet use. Even though the loading scores of the variables were not necessarily high for each factor, the reliability statistics confirmed that variables in a factor reliably measured that factor (Standardized Cronbach alpha values were above 0.60[15]). The factor model assessing attitudes and perceptions accounted for 28.27% of the variance (Table D.2). Similarly, the factor model on non-attitudinal and non-perception variables accounted for 13.21% of the variance (Table D.3).

For each factor, one or two variables generally were dominant. The dominant actions for the perceived efficacy of energy efficiency measures for mitigating environmental impacts were replacing major appliances and installing additional insulation or windows (Table D.2, see loading scores). For the energy concern factor, the most important energy concern factors were global warming and the rapid increase in energy use in our society (Table D.2, see loading scores). All the variables in the factor relating to pro-saving energy attitudes were dominant. The dominant anti-saving energy attitude was being unable to do much to save money on energy bills

[15] Generally, in the scientific community, values above 0.6 are acceptable for exploratory research, whereas values above 0.7 are acceptable for confirmatory research (e.g. testing a theory). Since this research is exploratory, the value of 0.6 was chosen as a cutoff point between non-reliability and reliability of the constructs being measured.

(Table D.2, see loading scores). As for the factor analysis results of the non-attitudinal variables, only Internet use appeared. The most dominant variables in this factor were those that assessed use of the Internet for purchasing/financial transactions (Table D.3, see the loading scores).

Table D.2: Result of the Factor Analysis 2009 – Attitudes and Perceptions Only

MAXIMUM LIKELIHOOD VARIANCE EXPLAINED WITH VARIMAX ROTATION: 28.27%					
FACTORS	**ITEM LOADINGS**	**LOADING SCORES**	**MEAN**	**CRONBACH A**	**STANDARD CRONBACH A**
FOR THE FOLLOWING ACTIONS THAT YOU CAN TAKE TO REDUCE ENVIRONMENTAL IMPACT, PLEASE RATE EACH ACTION (APPLIES TO VARIABLES IN FACTOR 1 ONLY)					
Factor 1: Effectiveness of Energy Efficiency Actions	Setting heating or cooling temperature with programmable thermostat to use less energy (0 to 10 scale*)	0.490	7.00	0.70	0.70
	Replacing major appliances with more energy-efficient ones (0 to 10 scale*)	0.677	6.53		
	Replacing regular light bulbs and fixtures with energy-efficient ones (0 to 10 scale*)	0.492	7.45		
	Installing additional or upgraded insulation or windows (0 to 10 scale*)	0.637	5.60		
Factor 2: Energy Concerns	Global warming is a result of high energy use. (0 to 10 scale*)	0.616	6.00	0.66	0.66
	People should try to use less energy to reduce the need to build new power plants. (0 to 10 scale*)	0.514	7.72		
	We are using our energy supplies too fast. (0 to 10 scale*)	0.671	7.34		
Factor 3: Pro-saving Energy Attitudes	It is important to save energy in my home. (0 to 10 scale**)	0.726	8.84**	0.61	0.61
	Saving energy in my home helps me save money. (0 to 10 scale**)	0.720	8.99**		
Factor 4: Anti-saving Energy Attitudes	There is little I can do to save money on my energy bills. (0 to 10 scale**)	0.602	3.76**	0.60	0.60
	I am too busy to be concerned about saving energy in my home. (0 to 10 scale**)	0.512	2.58**		
	Conserving energy in my home will make no difference to the quality of the environment overall. (0 to 10 scale**)	0.586	3.32**		

* Zero corresponds to *strongly disagree* or *very low priority* and 10 corresponds to *strongly agree* or *very high priority*.

** The scale was transformed using the natural log function - ln(x). We did this because the distribution of the data was highly skewed. This lets us ensure that the variables were more normally distributed. However, the mean shown in the table is the mean of the raw data (scale 0 to 10), not the transformed data.

Table D.3: Result of the 2009 Factor Analysis – Rest of the Variables, Excluding Demographics

MAXIMUM LIKELIHOOD VARIANCE EXPLAINED WITH VARIMAX ROTATION: 13.21%					
FACTORS	**ITEM LOADINGS**	**LOADING SCORES**	**MEAN**	**CRONBACH A**	**STANDARD CRONBACH A**
Factor 1: Internet Use	Do you have access to the Internet at home? (yes/no)	0.598		0.60	0.87
	Do you use the Internet to complete financial transactions or purchases? (yes/no)	0.972			
	How often do you use the Internet to compete financial transactions or purchases? (1 to 6 scale*)	0.953	2.92		

* 1 corresponds to *never* and 6 corresponds to *multiple transactions per week*.

Regression

Table D.4 and Table D.5 show the results of the regression analysis. The overall regression models were significant; they explained either 47.5% of household energy consumption variance or 20.4% of the variance in respondents' willingness to adopt infrequent energy efficiency measures. Moreover, the energy consumption regression results indicated that there were four significant predictors of energy consumption at $p<0.05$ and three predictors that were significant at $p<0.1$. In the model of respondents' willingness to adopt infrequent energy efficiency measures, seven predictors were significant at $p<0.05$.

In particular, the significant regression coefficients on energy consumption suggested several factors. People living in a multifamily dwelling were more likely to use less energy (β= -0.155). Having more people in the home or a higher income increased the likelihood of greater energy use (β household size=0.198, β income=0.300). Additionally, our research indicated that homes heated with natural gas used more energy (in BTUs) than those heated with electricity (β=0.340). This finding may be related to other housing characteristics that were not included in the dataset, such as housing size or furnace type. Other factors, each with a significance level of $p<0.1$, included the respondents' age, if they lived in Eastern Oregon, and whether or not they used a home air conditioner. It appeared that being older or having an air conditioner increased the likelihood that respondents used more energy (β age=0.129, β a/c=0.128), whereas living in Eastern Oregon decreased that likelihood (β= -0.124).

As for the results of the infrequent energy efficiency behavior model, several factors were observed. Being an owner of a home, being aware of Energy Trust, or having more people in the home increased the likelihood that respondents would adopt the infrequent energy efficiency behavior (β ownership=0.239, β household size=0.120, β ETO awareness=0.104). Living in a multifamily dwelling or receiving energy services from an investor-owned utility decreased the likelihood of adopting this behavior (β house type= -0.134, β investor-owned utility= -0.091). Furthermore, attitudes and perceptions appeared to influence the adoption of the infrequent

energy efficiency behavior. Higher levels of concern about energy use or a greater belief in the efficacy of energy efficiency measures increased the likelihood that respondents would adopt infrequent energy efficiency measures in the home (β energy concerns=0.120, β efficacy of EE measures=0.164).

In summation, we found that only household size and housing characteristics were significant predictors of energy consumption in the home. In the model assessing the adoption of infrequent energy efficiency behavior, we found that, in addition to household size and housing characteristics, attitudes, and perceptions were important. This was a notable finding.

Table D.4: Energy Consumption Regression Model – Results

OVERALL MODEL [a]	N	R	R^2	F	SIG. [b]
	203	**0.690**	**0.475**	**5.197**	**0.000**
PREDICTORS	**B**	**SE**	**β**	**T**	**SIG.**
Constant	**55871058**	**38559709**		**1.449**	**0.149**
ENERGY ATTITUDES AND PERCEPTIONS					
Perceived Efficacy of Energy Efficiency Actions (Factor)	2105	1202865	0.000	0.002	0.999
Energy Concerns (Factor)	904110	1351486	0.043	0.669	0.504
Pro-Saving Energy Attitudes (Factor)	-15240445	10891728	-0.088	-1.399	0.164
Anti-Saving Energy Attitudes (Factor)	-1816400	5285132	-0.022	-0.344	0.732
Rate the Level of Your Home's Energy Efficiency (0 to 10 Scale: 0=Least Efficient to 10=Most Efficient)	-1994422	1568762	-0.089	-1.271	0.205
Energy Efficiency and Renewable Energy Awareness					
Energy Trust Awareness (1=Yes, 0=No)	-4979737	6706953	-0.052	-0.742	0.459
Energy Trust Program Participation (1=Yes, 0=No)	-8092673	9237081	-0.058	-0.876	0.382
Tax Credit or Rebate Awareness for Installing EE or RE Equipment (1=Yes, 0=No)	-7086699	7700950	-0.065	-0.920	0.359
ENERGY STAR Consideration When Purchasing Appliances and Electronics (1 To 4 Scale: 1=Never, 4=Always)	999821	2449080	0.028	0.408	0.684
ACCESS TO INFORMATION					
Internet Use (Factor)	4367974	3762896	0.080	1.161	0.247

Continued

OVERALL MODEL [a]	N	R	R^2	F	SIG. [b]
	203	0.690	0.475	5.197	0.000
PREDICTORS	**B**	**SE**	**β**	**T**	**SIG.**
Constant	55871058	38559709		1.449	0.149
HOUSING CHARACTERISTICS					
Do You Have A/C (1=Yes, 0=No)	12290537	6607514	0.128	1.860	0.065
Thermostat Control (1=Can Change Temp. Settings, 0=Can Only Turn On/Off or No Control)	-4398714	7297922	-0.039	-0.603	0.547
House Type (1=Multifamily, 0=Single-Family)	-23673351	10668458	-0.155	-2.219	0.028
House Type (1=Mobile, 0=Single-Family)	-18963974	13266171	-0.094	-1.429	0.155
House Age (1 To 9 Scale: 1=Before 1930, 9=2000 Or Later)	-239683	1343459	-0.012	-0.178	0.859
Heating Source (1=Natural Gas, 0=Electricity)	32584441	8735996	0.340	3.730	0.000
Heating Source (1=Other, 0=Electricity)	-2778368	9953006	-0.021	-0.279	0.780
Water Heating Source (1=Electricity, 0=Natural Gas)	701615	8027307	0.007	0.087	0.930
Count of Infrequent EE Measures Done In the Last 12 Months	-1264006	3103477	-0.026	-0.407	0.684
HOUSEHOLD CHARACTERISTICS					
Decision Maker (1=Yes, 0=Make Decisions with Others In the Household)	-1138994	5812882	-0.012	-0.196	0.845
Sex (1=Male, 0=Female)	2324692	5847986	0.023	0.398	0.691
Age (1 to 8 Scale: 1=24 Yrs or Younger, 8=75 Yrs or Older)	3068230	1846671	0.129	1.661	0.098
Owner (1=Yes, 0=No, Renter)	10739685	9187995	0.092	1.169	0.244
Utility Bills (1=Pay All The Bills, 2=Fully or Partially Included In the Rent)	-6308695	22016806	-0.018	-0.287	0.775
Number of People In the Home	6687009	2345325	0.198	2.851	0.005
Education (1 To 6 Scale: 1=Less Than HS, 6=Post-Graduate Degree)	349205	2211078	0.011	0.158	0.875
Household Income (1 To 9 Scale: 1=Less Than $10K, 9=$200K or More)	7648304	1871246	0.300	4.087	0.000
Region (1=Willamette/N. Coast, 0=Portland)	-4074647	7125972	-0.037	-0.572	0.568
Region (1=South Or, 0=Portland)	2994330	11787496	0.017	0.254	0.800
Region (1=Eastern Or, 0=Portland)	-21968622	11355984	-0.124	-1.935	0.055

a. Dependent variable: annual BTU consumption per household

b. **Red** corresponds to the significance level at p<0.05. **Blue** corresponds to the significance level of p<0.1.

Table D.5: Adoption of Infrequent Energy Efficiency Measures Regression Model – Results

OVERALL MODEL [a]	N	R	R^2	F	SIG. [b]
STEPWISE MODEL	**444**	**0.452**	**0.204**	**15.979**	**0.000**
PREDICTORS	**B**	**SE**	**β**	**T**	**SIG.**
1. Constant	**0.638**	**0.076**		**8.43**	**0.000**
Owner (1=Yes, 0=No, Renter)	0.611	0.091	0.304	6.702	0.000
2. Constant	**0.069**	**0.131**		**0.524**	**0.601**
Owner (1=Yes, 0=No, Renter)	0.618	0.089	0.307	6.98	0.000
Effectiveness of Energy Efficiency Actions (Factor)	0.083	0.016	0.231	5.237	0.000
3. Constant	**-0.163**	**0.152**		**-1.073**	**0.284**
Owner (1=Yes, 0=No, Renter)	0.654	0.089	0.325	7.379	0.000
Effectiveness of Energy Efficiency Actions (Factor)	0.08	0.016	0.222	5.065	0.000
Number of People In the Home	0.087	0.029	0.13	2.949	0.003
4. Constant	**-0.206**	**0.151**		**-1.359**	**0.175**
Owner (1=Yes, 0=No, Renter)	0.624	0.088	0.311	7.056	0.000
Effectiveness Of Energy Efficiency Actions (Factor)	0.076	0.016	0.209	4.802	0.000
Number Of People In The Home	0.088	0.029	0.133	3.025	0.003
Energy Trust Awareness (1=Yes, 0=No)	0.242	0.085	0.125	2.862	0.004
5. Constant	**-0.454**	**0.184**		**-2.468**	**0.014**
Owner (1=Yes, 0=No, Renter)	0.643	0.088	0.32	7.277	0.000
Effectiveness of Energy Efficiency Actions (Factor)	0.063	0.017	0.175	3.81	0.000
Number of People In the Home	0.094	0.029	0.141	3.223	0.001
Energy Trust Awareness (1=Yes, 0=No)	0.241	0.084	0.125	2.864	0.004
Energy Concerns (Factor)	0.043	0.018	0.108	2.353	0.019
6. Constant	**-0.254**	**0.205**		**-1.239**	**0.216**
Owner (1=Yes, 0=No, Renter)	0.477	0.116	0.237	4.109	0.000
Effectiveness of Energy Efficiency Actions (Factor)	0.063	0.016	0.174	3.819	0.000
Number of People In the Home	0.083	0.029	0.125	2.833	0.005
Energy Trust Awareness (1=Yes, 0=No)	0.239	0.084	0.124	2.847	0.005
Energy Concerns (Factor)	0.045	0.018	0.112	2.448	0.015
House Type (1=Multifamily, 0=Single-Family)	-0.269	0.123	-0.125	-2.195	0.029

Continued

OVERALL MODEL [a]	N	R	R^2	F	SIG. [b]
STEPWISE MODEL	444	0.452	0.204	15.979	0.000
PREDICTORS	**B**	**SE**	**β**	**T**	**SIG.**
7. Constant	-0.175	0.207		-0.843	0.400
Owner (1=Yes, 0=No, Renter)	0.480	0.116	0.239	4.147	0.000
Effectiveness Of Energy Efficiency Aations (Factor)	0.059	0.017	0.164	3.597	0.000
Number Of People In The Home	0.080	0.029	0.12	2.718	0.007
Energy Trust Awareness (1=Yes, 0=No)	0.201	0.085	0.104	2.358	0.019
Energy Concerns (Factor)	0.048	0.018	0.12	2.622	0.009
House Type (1=Multi Fam, 0=Single Fam)	-0.288	0.122	-0.134	-2.352	0.019
Utility Provider (1=PUD, 0=IOU)	-0.191	0.093	-0.091	-2.056	0.040

a. Dependent variable: count of the infrequent energy efficiency measures done in the last 12 months

b. **Red** corresponds to the significance level at p<0.05. **Blue** color corresponds to the significance level of p<0.1.

E SURVEY INSTRUMENT

ENERGY TRUST OF OREGON
2009 OREGON RESIDENTIAL ENERGY USE SURVEY

Introduction

Hello, my name is _____ with Opinion Dynamics Corporation. I'm calling to conduct an Oregon Residential Energy Use Survey. This is not a sales call and all responses will be kept confidential. I'd like to speak with a person who is responsible for paying the utility bills or making decisions about things such as adjusting your home's thermostat, selecting new appliances and large electronic devices. May I please speak with the person who is primarily responsible for your household's energy-related decisions?

[CONTINUE WITH DECISION-MAKER]

I1. Would you say that…

() You are primarily responsible for some or all of these decisions, or [SKIP TO Q1]
() You share responsibility for these decisions with others? [SKIP TO Q1]
() (Don't know) [THANK AND TERMINATE]
() (Refused) [THANK AND TERMINATE]

Q1. Prior to today, have you heard of Energy Trust of Oregon?

() Yes
() No
() (Don't know)
() (Refused)

Today, I am speaking to Oregon residents on behalf of Energy Trust of Oregon about how households use energy. All responses will be kept confidential and used strictly for research purposes. First, I have a few questions to see if you qualify for this study.

Screeners

QU1: What is your zip code?

[NUMERIC OPEN END (5 digits)]
(Refused) [THANK AND TERMINATE]

S1. Is this location used primarily as a residence or as a business?

() Residence
() Business [THANK AND TERMINATE]
() (Don't Know) [THANK AND TERMINATE]
() (Refused) [THANK AND TERMINATE]

S2. Are you, or is anyone in your household, an employee of an electric or gas utility company?

() Yes [THANK AND TERMINATE]
() No
() (Don't Know) [THANK AND TERMINATE]
() (Refused) [THANK AND TERMINATE]

QU2: DO NOT READ - RECORD GENDER

() (MALE)
() (FEMALE)

QU3: Do you own or rent your home?

() Own
() Rent
() (Don't know) [THANK AND TERMINATE]
() (Refused) [THANK AND TERMINATE]

[ASK IF QU3=Rent]

QU3a: Do you pay your utility bills or are they included in your rent?

() Pay all utility bills
() Utility bills are included in rent
() Pay some utility bills, others are included in rent
() (Don't know)
() (Refused)

QU4: Please stop me when I get to the type of house you live in. [READ LIST]

() A single-family detached house
() A duplex, townhouse, row house or small apartment with 2-4 total units
() An apartment, condominium, or townhouse with 5 or more total units
() A mobile or manufactured house
() Other (specify) _____
() (Don't Know) [THANK AND TERMINATE]
() (Refused) [THANK AND TERMINATE]

QU5: Please stop me when I get to your age group. [READ LIST]

() 24 yrs or younger
() 25 to 34 yrs
() 35 to 44 yrs
() 45 to 54 yrs
() 55 to 59 yrs
() 60 to 64 yrs
() 65 to 74 yrs
() 75 or older
() (Refused) [THANK AND TERMINATE]

CHECK QUOTA

Geographic Region
Portland metro (47%, n=423)
Willamette Valley, north coast (30%, n=270)
Southern Oregon, south coast (12%, n=108)
East of the Cascade (11%, n=99)

Climate Zone
Zone 1
Zone 2
Zone 3

Gender
Male (50%, n=450)
Female (50%, n=450)

Homeownership
Renter (36%, n=324)
Owner (64%, n=576)

Housing Structure
Single-family home (68%, n=612)
Multifamily home (23%, n=207)
Mobile home and other (9%, n=81)

Respondent Age
24 yrs or younger (5%, n=46)
25 to 34 yrs (17%, n=154)
35 to 44 yrs (18%, n=163)
45 to 54 yrs (21%, n=190)
55 to 59 yrs (10%, n=91)
60 to 64 yrs (8%, n=73)
65 to 74 yrs (10%, n=91)
75 or older (10%, n=91)

You have qualified for this survey, now let's go to the first question.

S3. What is the name of your natural gas utility, if you use one? [IF NEEDED: Natural gas comes in a pipe to the house.] [DO NOT READ LIST]

(IF NOT IN THE LIST: That is not one of the natural gas companies on my list. Are you certain that that is your natural gas utility?)

() (Northwest Natural)
() (Cascade Natural Gas)
() (Avista)
() (NO NATURAL GAS COMPANY)
() (Don't Know)
() (Refused)

S4. What is the name of your electric utility? [DO NOT READ LIST]

() (PGE, Portland General Electric)
() (Pacific Power [Pacific Power and Light, PP&L, PacifiCorp])
() (EWEB [Eugene Water & Electric Board])
() (other (SPECIFY) _____)
() (Don't Know)
() (Refused)

Energy Trust Awareness

[IF Q1~=YES, SKIP TO Q4]

Q2. To the best of your knowledge, what does Energy Trust offer? [DO NOT READ, PROBE TO CLARIFY PROPER CATEGORIES]

() (Energy saving programs for homes (such as Home Energy Solutions for existing homes/residential, Home Performance with Energy Star, New Homes))
() (Energy saving programs for businesses)
() (Cash incentives/rebates for energy saving products and installation (such as appliances, refrigerator recycling, weatherization))
() (Cash incentives/rebates/grants for renewable energy systems (such as solar electric/photovoltaics, solar water heating, wind turbines/wind power))
() (Home energy analysis (home audits, online)
() (Other, specify)
() (Don't Know)
() (Refused)

Q3. From whom or how did you first hear about Energy Trust and its offers? [DO NOT READ, PROBE APPROPRIATELY TO GET ONE CATEGORY]

() (Word of mouth (friend, neighbor, family, co-worker))
() (Contractor/retailer)
() (Energy Trust (website, representative, advertising)
() (Utility (website, bill insert, representative, advertising))
() (Mass media (sign, billboard, newspaper/magazine ad, tv/radio ad))
() (Event (conference, seminar, workshop))
() (Online search, web links)
() (Other, specify)
() (Don't Know)
() (Refused)

Q4. Prior to today's call, were you aware that rebates and tax credits are available for installing certain energy saving equipment or renewable energy systems in your home?

() Yes
() No
() (Don't Know)
() (Refused)

[IF Q4=yes]

Q4a. Who offers these tax credits? [Multiple response]

() (Natural gas utility, including Northwest Natural, Cascade Natural Gas, and Avista)
() (Electric utility, including PGE (Portland General Electric) and Pacific Power (Pacific Power and Light, PP&L, PacifiCorp)
() (Other utility)
() (State of Oregon)
() (Energy Trust of Oregon)
() (Other, specify)
() (Don't know)
() (Refused)

Q4b. And who offers the rebates? [Multiple response]

() (Natural gas utility, including Northwest Natural, Cascade Natural Gas, and Avista)
() (Electric utility, including PGE (Portland General Electric) and Pacific Power (Pacific Power and Light, PP&L, PacifiCorp)
() (Other utility)
() (State of Oregon)
() (Energy Trust of Oregon)
() (Other, specify)
() (Don't know)
() (Refused)

Program Participation

[IF Q1~=YES, SKIP TO Q9]

Q5. Have you ever participated in any Energy Trust program or received a rebate check from Energy Trust?

() Yes
() No
() (Don't Know)
() (Refused)

[IF Q5=YES]

Q7. Using a 5-point scale, where 1 is "very dissatisfied" and 5 is "very satisfied," how satisfied were you with your experience with Energy Trust?

() 1: very dissatisfied
() 2
() 3
() 4
() 5: very satisfied
() (Don't Know)
() (Refused)

Q7a. Why did you say that? [Open End]

() (Don't Know)
() (Refused)

Q8. Do you think you will participate in Energy Trust programs in the next 12 months?

() (Yes)
() (Maybe)
() (No)
() (Don't Know)
() (Refused)

[ASK HALF OF THOSE THAT ANSWERED QU3=Own]

Q8a. Energy Trust of Oregon offers a free service called Home Energy Review, a one hour walkthrough of your home during which an Energy Advisor assesses areas of energy loss such as insulation levels, air sealing and windows. Have you heard of this program?

() Yes, but haven't had a Home Energy Review [Probe to see if they have had one before]
() No
() (Yes, Already had a Home Energy Review)
() (Refused)

[SKIP IF Q8a="Already had a Home Energy Review]

Q8b. On a scale of 0 to 10, where 0 is "very unlikely" and 10 is "very likely", how likely are you to participate in this type of service?

0 1 2 3 4 5 6 7 8 9 10, (Don't Know), (Refused)

[ASK THE OTHER HALF OF THOSE THAT ANSWERED QU3=Own]

Q8c. Energy Trust of Oregon offers a program called Home Performance with Energy Star, a 3-4 hour assessment of your entire home led by a trained contractor using diagnostic equipment. This program typically costs a few hundred dollars and results in a detailed action plan and a cash incentive report for the recommended improvements. Have you heard of this program?

() Yes, but haven't had a Home Performance with Energy Star assessment [Probe for whether they have had an assessment]
() No
() (Already had a Home Performance with Energy Star assessment)
() (Refused)

[SKIP IF Q8c="Already had a Home Performance with Energy Star assessment]

Q8d. On a scale of 0 to 10, where 0 is "very unlikely" and 10 is "very likely", how likely are you to participate in this type of service?

0 1 2 3 4 5 6 7 8 9 10, (Don't Know) (Refused)

Assessment of Home Energy Efficiency

Q9. Using a 0 to 10 scale, where 0 is "the least energy efficient home" and 10 is "the most energy efficient home", please rate the level of your home's energy efficiency.

0 1 2 3 4 5 6 7 8 9 10, (Don't Know) (Refused)

[IF Q9~= Don't Know]

Q10. Please tell me what it is about your home or the equipment in your home that lead to your choice of [PIPE RESPONSE IN Q9]. [DO NOT READ, CHECK ALL THAT APPLY]

[] (Appliances)
[] (Lighting, CFLs)
[] (Insulation)
[] (Windows, caulking, weatherization)
[] (Temperature setting)
[] (Heating equipment)
[] (Cooling equipment)
[] (Water heater)
[] (Other equipment)
[] (Behaviors—do/don't turn off lights, unplug electronics, etc.)
[] (Other, specify)
[] (Don't Know)
[] (Refused)

Attitudes, Perceptions, and Beliefs

Q11. Now, we'd like to understand how you think about using energy in your home. Using a 0 to 10 scale where 0 means you "strongly disagree," and 10 means you "strongly agree," please indicate how much you agree or disagree with each of the following statements. How much do you agree or disagree that…? [RANDOMIZE ALL]

0 1 2 3 4 5 6 7 8 9 10, (Don't Know), (No Opinion) (Refused)

General conservation attitude, social norms

a. It is important to save energy in my home
b. Energy efficiency and conservation is a frequent topic of conversation with my friends and family
c. I am planning to take some measures to use less energy at home this year

Constraints, perceived barriers

d. Comfort is very important to my household, even if it means spending more each month for energy
e. There is very little I can do to save money on my energy bills
f. I would like to do more to make my home more energy efficient, but I don't know where to start
g. Energy efficient products and services are readily available
h. I'm too busy to be concerned about saving energy in my home

Economic drivers

i. Saving energy in my home helps me save money
j. I worry that the cost of energy for my home will increase

Environmental factors

k. Conserving energy at my home will make no difference to the quality of the environment overall
l. Global warming is a result of high energy use

Knowledge

m. Heating, cooling, and lighting are more significant sources of energy use than electronics in most homes
n. I am interested in knowing how energy use in my home compares with other similar homes in the area
o. All of the appliances on the market today are energy efficient

Social responsibility

p. People should try to use less energy to reduce the need to build new power plants
q. We are using up our energy supplies too fast

Trusted information sources

r. The Oregon Department of Energy provides good information about saving energy
s. My electric utility provides good information about saving energy
t. Specialty contractors provide good information about saving energy
u. [SKIP IF S3=NO NATURAL GAS] My gas utility provides good information about saving energy
v. [SKIP IF Q1=NO, DK, REF] Energy Trust of Oregon provides good information about saving energy

Use of Energy

Next, I'd like to discuss features of your home that could affect your home's energy consumption.

Q12. Since January 2007, have you gotten rid of (sold, given away, thrown out, etc.) a refrigerator or freezer and not replaced it?

() Yes
() No
() (Don't Know)
() (Refused)

Q13. Does your home have air conditioning?

() Yes
() No
() (Don't Know)
() (Refused)

[IF Q13=YES]

Q14. What type of air conditioning system do you have? Is it…

() Heat pump
() Central air conditioning (verify not heat pump)
() Room air conditioner
() (Other: _____)
() (Don't Know)
() (Refused)

Q15. Do you have any energy-saving light bulbs, also known as compact fluorescents or CFLs, in your home? These are often twisty or swirly looking bulbs or have a bend.

() Yes
() No
() (Don't Know)
() (Refused)

[IF Q15=YES]

Q16. Approximately how many of these bulbs do you have installed in your home? Would you say…?

() 1-5
() 6-10
() 11-20
() more than 20
() (Don't Know)
() (Refused)

Q17. Do you have thermostats that control the heating and/or cooling system for all or most of your home?

() Yes
() No
() (Don't Know)
() (Refused)

[IF Q17~=YES, SKIP TO Q20]

Q18. Does the thermostat allow you to…

() Turn on/off only
() Set the temperature only
() Set different temperatures for different times
() (Don't Know)
() (Refused)

[IF Q18=SET DIFFERENT TEMPERATURE FOR DIFFERENT TIMES]

Q19. Do you regularly use the automatic features of your thermostat to change the temperature at different times of day or night?

() Yes
() No
() (Don't Know)
() (Refused)

Q20. In the last 12 months, what else have you done if anything, to reduce your home's energy usage? [DO NOT READ, CHECK ALL THAT APPLY]

[] (Added insulation)
[] (New efficient windows)
[] (Weatherization like caulking or weather stripping)
[] (New heating/cooling temperature control)
[] (Heating/cooling system upgrade)
[] (Water heater temperature control)
[] (Water heater system upgrade)
[] (Use/purchase of efficient appliance)
[] (Lighting/system control and upgrade)
[] (Solar/alternate power)
[] (Other: _____)
[] (Nothing)
[] (Don't Know)
[] (Refused)

Q21. A power strip is a portable strip of sockets that allow you to plug in multiple devices. How many of these power strips are used in your home?

_____ # OF POWER STRIPS
() (Don't know)
() (Refused)

[ASK IF Q21>=1 AND NOT DK OR REFUSED ELSE Q22a]

Q22. How often do you turn off the switch on any of your power strips or unplug a strip, shutting down all the devices that are plugged in? Would you say…?

() Never or rarely
() Less than half the time that you are done using a piece of equipment
() More than half the time that you are done using a piece of equipment
() Any time you are not using any of the equipment
() (Don't Know)
() (Refused)

[ASK IF QU3=own]

Q22a. Have you installed any of the following in your home since January 2007? [1=yes, 2=no, 3=don't know, 4=(Refused)]

a. Windows
b. Insulation
c. Heating system
d. Cooling system
e. Duct sealing/air sealing

[If 22a a-e=1]

Q22F. Did you install one of these measures that I just listed by yourself or did you use a contractor?

() (I installed)
() (Contractor installed)
() (Other, specify)
() (Don't know)
() (Refused)

Decision Making/Conditions that Affect Adoption of EE Behaviors

Q23. Have you ever heard of ENERGY STAR?

() Yes
() No
() (Don't Know)
() (Refused)

[IF Q23=YES]

Q24. When purchasing electronic goods or appliances, do you:

() always consider ENERGY STAr models
() consider ENERGY STAR models in more than half my purchases
() consider ENERGY STAR models in fewer than half my purchases
() never consider, or you don't pay attention to ENERGY STAR models
() (Don't Know)
() (Refused)

Q25. For the following actions that you can take to reduce your environmental impact, please rate each action using a 0 to 10 scale where 0 means 'very low priority' and 10 means 'very high priority'. How about… [RANDOMIZE] [0-10, (Don't Know), (Refused)

a. Walking, biking, or using mass transit instead of driving
b. Recycling paper, cans, bottles and plastics
c. Setting heating or cooling temperature with programmable thermostat to use less energy
d. Driving an electric or hybrid gas-electric vehicle
e. Replacing major appliances with more energy-efficient ones
f. Replacing regular light bulbs and fixtures with energy-efficient ones
g. Installing additional or upgraded insulation or windows

[ASK IF QU3=Rent]

Q25a. Have you had discussions with your landlord or building manager about making your unit more energy efficient?

() Yes
() No
() (Don't know)
() (Refused)

Renewable Energy

[ASK IF QS4=1,2,3 ELSE Q26a]

Q26. Does [PIPE: ELECTRIC UTILITY] offer a "green power" option? [IF NEEDED: where you pay a little extra for electricity from a renewable source like wind or solar]

() Yes
() No
() (Don't Know)
() (Refused)

[ASK IF QS4=00 (OTHER) ELSE Q27]

Q26a. Does [PIP: ELECTRIC UTILITY OTHER RESPONSE] offer a "green power" option? [IF NEEDED: where you pay a little extra for electricity from a renewable source like wind or solar]

() Yes
() No
() (Don't Know)
() (Refused)

[IF Q26=YES ELSE Q27A]

Q27. Is your household participating in [PIPE: ELECTRIC UTILITY]'s "green power" program?

() Yes
() No
() (Don't Know)
() (Refused)

[IF Q26a=YES ELSE Q28]

Q27a. Is your household participating in [PIPE: ELECTRIC UTILITY]'s "green power" program?

() Yes
() No
() (Don't Know)
() (Refused)

[SKIP TO Q30 IF QS3=4,5,6]

Q28. Does [PIPE: GAS UTILITY] offer a carbon offset program? [IF NEEDED: where you pay a little extra on your gas bill to bring biogas to our region, allowing you to offset the greenhouse gases associated with your natural gas use while investing in a viable renewable energy source]

() Yes
() No
() (Don't Know)
() (Refused)

[ASK IF Q28=YES ELSE Q30]

Q29. Is your household participating in [PIPE: GAS UTILITY]'s carbon offset program?

() Yes
() No
() (Don't Know)
() (Refused)

Q30. Have you looked for information on renewable energy such as solar or wind energy for your home in the last year?

() Yes
() No
() (Don't Know)
() (Refused)

[IF Q30=YES]

Q31. Where did you look for information? [DO NOT READ, CHECK ALL THAT APPLY]

[] (Your Electric Utility)
[] (A contractor)
[] (A home improvement store)
[] (Energy Trust)
[] (Oregon Department of Energy (ODOE))
[] (Northwest Energy Efficiency Alliance (NEEA))
[] (Web search)
[] (Library)
[] (Neighbor, family, friend, coworker, etc.)
[] (Other:_____)
[] (Don't Know)
[] (Refused)

Market

Q32. What are the primary sources of information you use to get general news or information? [DO NOT READ LIST, PROBE TO CLARIFY ALL PROPER CATEGORIES]

() (Newspaper)
() (Radio)
() (TV)
() (Online)
() (Friends, family, coworkers)
() (Other, specify)
() (Don't Know)
() (Refused)

Q32a. Do you have access to the Internet at home?

() Yes
() No
() (Don't know)
() (Refused)

Q32b. Do you use the Internet to complete financial transactions or purchases?

() Yes
() No
() (Don't know)
() (Refused)

[ASK IF Q32b=Yes]

Q32c. How often do you use the Internet to complete financial transactions or purchases? [Probe from list as necessary]

() (Multiple transactions per week)
() (Multiple transactions per month)
() (Once per month)
() (A few times per year)
() (Once a year)
() (Never)
() (Don't know)
() (Refused)

Housing and Demographic Information

Q33. About when was your home built? [DO NOT READ LIST]

() (Before 1930)
() (1930 to 1939)
() (1940 to 1949)
() (1950 to 1959)
() (1960 to 1969)
() (1970 to 1979)
() (1980 to 1989)
() (1990 to 1999)
() (2000 or later)
() (Don't Know)
() (Refused)

Q34. How many stories are there in your home, not including the basement or unfinished attic?

_____ # OF STORIES
(Don't Know)
(Refused)

Q35. Approximately how many square feet of living space are there in this residence?

() _____ SQUARE FEET
() (Don't Know)
() (Refused)

Q36. Do you heat your home primarily with electricity, natural gas, or something else? [DO NOT READ LIST, BUT PROBE IF NEEDED]

() (Electricity)
() (Natural gas)
() (Liquid propane gas, LPG)
() (Fuel oil, kerosene)
() (Wood)
() (Pellet stove)
() (Solar)
() (Other)
() (No fuel)
() (Don't Know)
() (Refused)

Q37. Do you heat your water primarily with electricity, natural gas, or something else? [DO NOT READ LIST, BUT PROBE IF NEEDED]

() (Electricity)
() (Natural gas)
() (Liquid propane gas (LPG))
() (Fuel oil)
() (Solar)
() (Don't Know)
() (Refused)

Q38. How many people, including yourself, live in your home now?

_____ # OF PEOPLE
() (Refused)

[IF Q38>=2]

Q39. How many school-aged children 18 years or younger live in your household?

() _____# OF SCHOOL-AGED CHILDREN
() (None)
() (Refused)

Q40. What is the highest level of education you have achieved so far? [DO NOT READ LIST]

() (High school or less)
() (High school diploma)
() (Some college/associate degree/trade school)
() (Four-year college degree)
() (Some post-graduate studies)
() (Post-graduate degree/Masters, PhD, professional degree)
() (Don't Know)
() (Refused)

Q41. Please stop me when I get the range of your household's total annual income before taxes:

() Less than $50,000
() $50,000 - $109,999, or [SKIP TO Q41b]
()$110,000 or more? [SKIP TO Q41c]
() (Refused) [SKIP TO Q42]

Q41a. Is it…

() Less than $10,000 [SKIP TO Q42]
() $10,000 - $29,999 [SKIP TO Q42]
() $30,000 - $49,999 [SKIP TO Q42]
() (Refused) [SKIP TO Q42]

Q41b. Is it…

() $50,000 - $69,999 [SKIP TO Q42]
() $70,000 - $89,999 [SKIP TO Q42]
() $90,000 - $109,999 [SKIP TO Q42]
() (Refused) [SKIP TO Q42]

Q41c. Is it…

() $110,000 – $149,999
() $150,000 - $199,999
() $200,000 or more
() (Refused)

Follow-up

Q42. Energy Trust is planning to conduct more research in the future. Would you be willing to participate in an email survey?

() Yes
() No
() (Don't Know)
() (Refused)

[IF Q42=YES]

Q42a. What is your email address to which this survey should be sent?

_____
() (Refused)

[IF NOT SHOWN ON REVERSE DIRECTORY]

Q43. One objective of this study is to better understand how a household's energy bill may vary depending on how energy efficient the household seems to be. Rather than asking you to estimate how much energy you have consumed, Energy Trust would like to access this information from your account history and link it to the responses you've given today. To do this, we need the exact address of your residence. Can you please provide us with your address?

Street: _____
Apt #: _____
City: _____
() (Refused)