research/into/action inc

Final Report

Engineering Review and Process Evaluation of the Energy Trust New Homes Program

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ES EXECUTIVE SUMMARY

Energy Trust of Oregon's New Homes program – implemented by Portland Energy Conservation Inc. (PECI) and its subcontractor, Conservation Services Group (CSG) – promotes improved new-home design techniques and the installation of energy-efficient materials and appliances. The program also educates homebuyers about the benefits of energy-efficient homes and encourages buyers to seek efficient homes out in the marketplace.

In the past, this program has relied on promoting building to the ENERGY STAR® level, where computed energy use is 85% of the energy consumption for a similar house built to Oregon code. To simplify compliance, a prescriptive standard has been developed for ENERGY STAR® certification, with additional incentives to encourage emerging measures. Following a code change that went into effect in June 2008, since 2009, the program has offered the Energy Performance Score (EPS) as a way to rate and promote new site-built homes and claim savings on all upgrades above code. The goal of the EPS is to educate realtors and consumers to the relative efficiency of homes and transform market demand toward more energy-efficient homes.

In July 2009, Research Into Action, Inc., together with its subcontractor, Stellar Processes, Inc., was hired to carry out an engineering review and process evaluation to determine how builders are responding to the new program.

ENGINEERING REVIEW

The engineering review covered the measures included and the estimation tools used for the New Homes program.

Review of Measures

Of 55 new residential projects that have received an EPS rating, only 10% of the projects failed to meet ENERGY STAR® certification requirements; thus, efforts to promote the EPS rating have not diluted efforts to achieve ENERGY STAR® participation.

The EPS for ENERGY STAR®-qualified cases averaged 82% of that of a house built to code, and a few builders were able to achieve 60% to 70% of code. However, slightly more than half the qualified cases had EPS above 85% of the code-built house. For many of these cases, the added energy consumption came from mechanical ventilation needed with tighter shells, which was not taken into account in the development of the ENERGY STAR® requirements. Program staff reported they are trying to educate builders in more efficient ventilation approaches.

Most builders have reached ENERGY STAR® by constructing a tighter shell, reflecting previous educational efforts. A few have chosen the tankless water heater path, a new ENERGY STAR®

option. Emerging measures still gaining market acceptance and not yet popular with builders included inside ducts, which require intervention early in the design process. Only one case was reported for each of two other of emerging technologies, 95% efficient gas furnace and a High Performance insulated shell. Although builders are allowed flexibility in trading off one measure for another, such a tradeoff appears to have been proposed in only two cases (4% of the sample).

In the case of radiant floor heating and mini-split system heat pump, it is not clear that the incentives use the proper base case and the modeling procedure for the radiant floor design is not clear. More development is needed to establish the appropriate base cases and modeling assumptions.

Review of Estimation Tools

Program staff currently use REM/*Rate*™ as a tool to estimate the energy savings relative to a code-minimum house. Although REM/*Rate*™ does not provide an accurate assessment of heat pump performance, staff have developed a post-processing spreadsheet that adjusts energy consumption adequately.

Alternatives include Ecotope's Simplified Energy Efficiency Model (SEEM), which offers better quantification of seasonal equipment performance and buffer space interactions. The spreadsheet could be made ready for use within the program with a similar ease of use as REM/*Rate*™ in about one month. Neither REM/*Rate*™ nor SEEM adequately deals with radiant floor systems, but high development costs and small market share probably make further development to address this low priority.

The estimating tools were compared in a prototypical house used in developing ENERGY STAR® requirements, excluding mechanical ventilation. The two procedures yield comparable EPS rating numbers, but REM/*Rate*™ appeared to be less sensitive to climate zone differences. It is difficult to account for the differences, but REM/*Rate*™ may not deal with buffer spaces as thoroughly as SEEM. Moreover, the methodology behind SEEM has been reviewed within the processes of the Regional Technical Forum (RTF) and, thus, represents some expert consensus.

PROCESS EVALUATION: SITE-BUILT HOMES

We interviewed eight program staff directly related to the site-built portion of the New Homes program and representatives from 18 homebuilders, ranging from small custom builders that build one to two homes per year to large production builders and builders that specialize in low-income housing. Builders were located across the state.

We found that the economic downturn of 2008-2009 had significant adverse impacts on all builders except small custom builders that have people on a waitlist for their services. Builders specializing in low-income housing actually saw more demand for their houses, but did not build more houses because the potential homeowners did not meet other requirements to own a home.

Builders come to the program mostly because of outreach efforts by the Builder Outreach Specialist (BOS) assigned to their area, while a few learned about the program through their interaction with their subcontractors, other builders, or affiliations with agencies or associations. Once in the program, builders were generally satisfied with the program assistance and incentive amounts. Builders held program staff and the paperwork process in high regard, and complaints were minimal. Most builders found the paperwork process easy because of assistance received from their BOS.

The New Homes program requires communication and coordination among multiple entities. Energy Trust, PECI, CSG, and Earth Advantage all have their own organizational structures and internal processes to manage, as well as coordinate with builders. Respondent interviews indicated that internal communication problems are kept to a minimum among program staff. Furthermore, communication between program staff and builders was seen as consistent and problem-free, according to most builders.

Builders participate in the program for a variety of reasons. Low-income housing builders are attracted to the program because they want to provide a house that will be inexpensive to operate for the homeowner. Schools are attracted to the program because they want to teach their students the latest techniques and designs in efficient homebuilding. Both small custom builders and larger builders are interested in the market distinction that program participation offers. The latter group, however, were more explicit about the importance of the program incentives in allowing them to offset the costs of improved efficiency.

Builders were not knowledgeable of program details. They did not speak the language of the program. Terms like Builder Option Packages (BOPs) were not necessarily known, and there seemed to be a lack of knowledge about whether they achieved savings equal to, above, or below ENERGY STAR® requirements. Respondents could list the measures they installed, but did not seem to have a clear understanding of how or why those measures equated to incentives, as they depended heavily on the BOSs to identify savings paths and calculate their incentives.

Most builders chose envelope upgrades to receive incentives, because they are the least expensive way to attain incentives and the first, and perhaps largest, step in making a house more energy-efficient. Also, builders were familiar with envelope upgrades, as they had been a part of the program before the introduction of EPS. Few have yet used inside ducts, but at least five builders reported plans to use them in the future.

Cost and perceived lack of consumer awareness or concern about energy efficiency were the primary barriers to installing more energy-efficient measures noted by builders, particularly larger builders. It is difficult to gauge whether the builders' own lack of knowledge about energy savings paths and incentives is an additional barrier.

PROCESS EVALUATION: MANUFACTURED HOMES

The evaluation team completed interviews with four program staff, two program field representatives, thirteen manufactured home retailers, and five manufacturers.

The manufactured homes portion of the New Homes program supports retailers in selling ENERGY STAR® or eco-rated homes through a variety of incentives and training to retailers. At least 50% of the manufactured homes market is ENERGY STAR®-rated and some manufacturers only build ENERGY STAR® homes.

The manufactured home program saw a decline in the number of qualified houses from prior years because of the economic downturn. All retailers indicated a decline in sales from 2008 and that current customers were requesting smaller houses with fewer amenities.

Program staff members reported that internal program communications are smooth. Retailers largely reported that their communication with program staff had been effective and that program staff were accessible, responsive to the retailers needs, and able to effectively answer the retailers' questions or resolve issues. Any communication challenges occurred during periods of change in program staffing or program offerings. Applications were easy to complete, requiring only occasional and minor assistance from program staff.

Consistent with the high penetration of ENERGY STAR®-qualified homes, all of the manufactured home retailers interviewed – those that carry only or primarily ENERGY STAR® homes as well as other retailers – reported that they promote energy efficiency as part of their sales pitch to customers and are successful in up-selling energy efficiency to at least half of their customers. All reported that customers were interested in efficiency and most called it a "significant" concern for customers. However, retailers also reported that some customers could not afford the added cost of an energy-efficient home, despite the potential for long-term savings and that it had become more difficult for customers to find financing, further limiting their ability to purchase additional energy-efficient features.

Manufactured home retailers largely supported program staff members' assertion that the sales incentive motivates retailers to participate in the program. Most reported that the sales incentive effectively motivates sales people to promote energy-efficient homes, with half of the retailers reporting that the sales incentive was the most valuable of all the program's offerings.

RECOMMENDATIONS

Measures Review

➡ ***Recommendation*: The modeling tool used to calculate the EPS rating needs to be able to allow for alternative construction practices and components, calculate the impact of buffer spaces, include options for space conditioning equipment, quantify internal gains from equipment and occupancy, and account for seasonal variation.**

- ***Recommendation*: Consider replacing the NWPCC spreadsheet tool with the SEEM model**.
- ***Recommendation*: Reconsider qualifications for "no duct" systems**.

Process Analysis: Site-Built Homes

- ***Recommendation*: Continue support for BOSs and provide them with tools to encourage participation, but also make incentives as transparent to builders as possible**.
- ***Recommendation*: Attempt to improve coordination between the New Homes program and the tax credit program**.
- ***Recommendation*: Continue to publicize and market the EPS to the broad public using popular media outlets and other methods.**

Process Analysis: Manufactured Homes

- ***Recommendation*: Continue to offer, and potentially expand, coop advertising assistance and model home incentives for manufactured home retailers.**
- ***Recommendation*: Build awareness among retailers and homebuyers of the eco-rated label or other labels signifying higher levels of energy efficiency than ENERGY STAR®.**
- ***Recommendation*: Continue to maintain consistency in staffing and strive for transparency in changes to program offerings.**
- ***Recommendation*: Consider offering incentives to manufactured home manufacturers.**

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EnergyTrust of Oregon

MEMO

Date: February 22, 2010
To: Board of Directors
From: Sarah Castor, Evaluation Project Manager
Kendall Youngblood, Residential Sector Manager, Efficient New Homes and ENERGY STAR® Products
Subject: Staff Response to the New Homes Program Engineering Review and Process Evaluation

This is the first process evaluation of Energy Trust's New Homes program since 2007 and the program has experienced significant change during this period. The program has now completed its transition to the new incentive structure and Energy Performance Score (EPS).

The process evaluation indicates that the program is working well for both participants and staff. Despite the simultaneous increase in building codes and downturn in the economy, Energy Trust's penetration in the new homes market has remained relatively stable, and satisfaction among builders and retailers is high.

Program staff anticipate an increase in the number of builders going above ENERGY STAR® standards as they gain more experience with new building techniques and the use of the EPS. We also feel that the evaluator's estimate of 3 to 5 years for widespread adoption of the EPS is reasonable, given the pace of the new homes market, although it may be accelerated by the release of an EPS for existing homes or statewide adoption of home energy labeling in the next year.

Although the evaluator recommended investigating the possible replacement of REM/*Rate*™ modeling with a tool reviewed by the Regional Technical Forum, we do not feel it is necessary at this point to move away from REM/*Rate*™. The program has invested significant resources in learning and adapting the software and we feel it serves the program's needs. However, we will continue to monitor the development of SEEM and other modeling tools for future use.

Findings for the site-built portion of the program indicate that the Builder Outreach Specialists (BOSs) are providing valuable outreach and program support to builders, but that builders often do not know about ENERGY STAR® requirements or understand incentive levels. To this end, the program

will work over the next year to increase builder familiarity with the new incentive levels and requirements.

On the manufactured homes side of the program, the program's move in 2008 to provide incentives to retailers rather than consumers appears successful; retailers report the incentive motivates them to promote more energy efficiency and they are successful in upselling efficiency in the majority of sales.

Cooperative marketing is an important part of our support for retailers and we plan to continue with the same level of total funding, while revising the requirements to provide more funds to retailers who sell more homes.

The program is also exploring the possibility for a tiered incentive with ENERGY STAR® manufactured homes as the base and a higher spec, such as eco-rated, earning a higher incentive. This will require building awareness among retailers and monitoring the supply of other specs from manufacturers. Currently, the program is not in a position to offer an incentive to manufacturers, although as the market becomes increasingly transformed toward ENERGY STAR®, such a strategy may be necessary to move to the next level of efficiency.

1 INTRODUCTION

Energy Trust of Oregon's New Homes program promotes improved new-home design techniques and the installation of energy-efficient materials and appliances. The program also educates homebuyers about the benefits of energy-efficient homes and encourages buyers to seek efficient homes out in the marketplace. Following a code change that went into effect in June 2008, since 2009, the program has offered the Energy Performance Score (EPS) as a way to rate and promote new site-built homes and claim savings on all upgrades above code.

In June 2009, Research Into Action, Inc., together with its subcontractor, Stellar Processes, Inc., was awarded a contract to conduct a process evaluation and engineering review of the New Homes program. The evaluation portion of this report provides information on program processes and feedback from builders, retailers, and manufacturers regarding their program experiences, preferences, and choices. The results will help Energy Trust ensure that the programs obtain the greatest possible savings in the new homes market.

PROGRAM DESCRIPTION

The Energy Trust New Homes program seeks to transform the market for both site-built and manufactured new homes in Oregon through outreach and incentives to homebuilders, manufactured home retailers, and other stakeholders, and through efforts to build homebuyer awareness of energy use. The New Homes program, in combination with the New Multifamily program, seeks to achieve cost-effective energy savings of 195,552 kWh and 65,066 therms by December 31, 2009.

Portland Energy Conservation Inc. (PECI) is the program management contractor (PMC) for both the site-built and the manufactured homes components of the New Homes program. Conservation Services Group (CSG) provides technical assistance to the program. In addition, Builder Outreach Specialists (BOSs), employed primarily by the Earth Advantage Institute, conducts outreach to homebuilders on behalf of the program, while field representatives employed by Applied Proactive Technologies, Inc. (APT) conduct the program's outreach to manufactured home retailers.

Site-Built Homes

The site-built homes component of the New Homes program recently transitioned from a focus on promoting ENERGY STAR®-qualified new homes to an approach centered on the home's Energy Performance Score (EPS), a measure that the program developed to calculate a home's overall energy use and compare it to the energy use of a similar home built to the building code's minimum requirements. The program hopes to use EPS to build awareness of energy use among

homebuyers, similar to the way that miles-per-gallon ratings inform car buyers of a vehicle's energy use. In addition, the use of EPS ratings allows for greater flexibility in the program's incentive structure for homebuilders.

The shift in program focus to EPS was a response, in part, to increased energy efficiency requirements in the Oregon residential building code that took effect in June 2008. ENERGY STAR® specifies that builders achieve 15% greater energy efficiency than the building code requires. As a result, under more stringent building codes, it is more difficult for builders to qualify for ENERGY STAR®. The EPS is designed to both recognize builders who build homes that are more efficient than code, but fail to achieve ENERGY STAR® compliance, and to provide incremental incentives to builders who exceed ENERGY STAR® standards.

Builders may pursue a variety of measures to achieve energy savings under the program. ENERGY STAR® has defined Builder Option Packages (BOPs), which are sets of prescriptive measures designed to achieve the efficiency levels 15% above code required for ENERGY STAR® certification. Three BOP paths are available to builders in Oregon: one focused on achieving efficiency through improvements to the shell of the house; a second focused on installation of tankless water heaters; and the third focuses on placing ducts inside conditioned space. In addition, the program encourages builders to pursue additional efficiency measures not included in the BOPs.

The program identifies potential participants by maintaining contact with the 29 local building permit authorities throughout Oregon. Within one month after a builder files a permit, the program sends the builder a packet of information and a BOS contacts the builder. If the builder is interested in participating, the BOS works with them to calculate a preliminary EPS for the home, based on building plans. The BOS will then continue to work with the builder to resolve any issues that develop surrounding the installation of efficiency measures and to encourage installation of any additional efficiency measures for which the BOS sees potential. Once construction is complete, program staff recalculate the home's EPS and provide incentives to the builder based on this final calculation.

In addition to providing incentives to builders for achieving energy savings above code, the program seeks to support builders in promoting efficient homes to homebuyers. As part of this effort, the program has worked with builders to promote EPS-rated homes in home tours. Additionally, BOSs work with real estate agents and builders' subcontractors to educate them about the program. The program also provides financial support to builders who promote EPS and energy efficiency in model homes.

Manufactured Homes

The manufactured homes component of the New Homes program – promoted as the New Manufactured Homes program – seeks to promote the sale of ENERGY STAR®-qualified or eco-rated manufactured homes.[1] Increased efficiency requirements in Oregon's building codes did not affect manufactured homes in the same way as site-built homes, and EPS ratings have not been applied to manufactured homes. The program targets manufactured home retailers with three primary offerings:

- **Sales Incentives.** The program offers incentives of $500 to manufactured home retailers for each ENERGY STAR®-qualified or eco-rated manufactured home they sell that is placed within Energy Trust's territory. About half the time, the incentive is given to the salesperson, while in the remaining cases, the incentive is given to the retailer.
- **Model Home Incentive.** The program provides retailers with up to $400 to outfit an ENERGY STAR®- or eco-rated home with marketing materials promoting the home's energy efficiency. Each retailer can take advantage of this incentive twice per year and model homes receiving the incentive must remain on display for a minimum of three months.
- **Cooperative Advertising Assistance.** The program pays 50% of the cost of advertisements by participating manufactured home retailers for advertisements promoting ENERGY STAR® and efficiency measures in manufactured homes. Advertisements must carry the ENERGY STAR® logo, a logo identifying the retailer as a program ally of Energy Trust, and ENERGY STAR® key messaging. Although the number of advertisements that a retailer places is not limited, the program will contribute a maximum of $2,500 to each participating retailer in a given year. All advertisements must be approved by program staff and retailers can choose to spend the incentive on multiple advertisements or on one large ad.

APT's field representatives provide the program's primary outreach to manufactured home retailers. The program works with approximately 55 manufactured home retailers across Oregon; field representatives visit each retailer approximately every six weeks to provide new materials, assist with program paperwork, inform retailers of program updates, and respond to any questions or concerns that the retailers may have.

[1] Eco-rated is a certification provided by the Northwest Energy Efficient Manufactured Home Program (NEEM), a joint program of the Oregon Department of Energy, Idaho Department of Water Resources – Energy Division, Montana Department of Environmental Quality, and Washington State University Energy Program. Eco-rated certification goes beyond ENERGY STAR® standards and incorporates additional "green" or sustainability criteria in addition to energy efficiency. Source: http://www.eco-rated.com/Site_2/eco-rated.html (last accessed: December 22, 2009).

EVALUATION OBJECTIVES

This process evaluation seeks to provide Energy Trust with insights that will inform program design as the New Homes program responds to changes in the state building code and the ENERGY STAR® specification for new homes, and as the program shifts its focus to the EPS rating system. To best achieve these goals, Energy Trust developed the following research objectives:

- Examine how the building industry is adapting to new building codes related to energy use, including the builders' ability to incorporate efficiency measures that allow new homes to exceed the new, more stringent codes.
- Analyze the cost-effectiveness of measures installed outside the BOPs.
- Investigate homebuilders' acceptance of the newly-developed ENERGY STAR® BOPs, including which BOPs builders pursue most frequently and why.
- Evaluate the methods used to model new home energy use and estimate savings.
- Examine the use and acceptance of EPS, both in providing a tiered incentive structure for builders and as a marketing tool to raise homebuyer awareness of energy use.
- Evaluate program offerings to the manufactured home industry, including offerings directed toward manufactured home retailers and the potential for outreach to manufacturers.

METHODOLOGY OVERVIEW

Following a review of program documents, the evaluation team conducted in-depth interviews with program staff, including representatives of Energy Trust, PECI, CSG, Earth Advantage Institute, and APT. Drawing on the research objectives and information from these interviews, the evaluation team conducted further in-depth interviews with participating homebuilders and manufactured home retailers as well as brief conversations with manufactured home manufacturers. Chapter 3 provides additional details about the sampling of each group interviewed, the types of information that each group of respondents provided, and the method of qualitative data analysis.

2 ENGINEERING REVIEW

This project reviewed the technical methods relating to the New Homes Program. In the past, this program has relied on promoting building to the ENERGY STAR® level, where computed energy use is 85% of the energy consumption for a similar house built to Oregon code.[2] To simplify compliance for builders, a prescriptive standard has been developed. If builders comply with all of the required component performance levels, they are certified as meeting ENERGY STAR® requirements. Some tradeoff opportunities are allowed – that is, saving more energy with one component and less with another – as long as the overall savings are achieved. One recognized alternative is the use of a tankless water heater in lieu of a more efficient building shell.

The program temporarily offers additional incentives to encourage emerging measures that are not yet widespread in the industry. One such measure is to avoid placing heating ducts in external spaces. Builders may accomplish this by bringing the ducts indoors or by eliminating the ducts entirely. Another such measure is a High Performance Shell, which is more complicated for builders to include in construction.

In addition to the ENERGY STAR® promotion, the program has also initiated an Energy Performance Score (EPS) rating system. The EPS rating is computed as the combined energy consumption (electric and natural gas) in units of MMBtu per year. The program provides the participant with a rating sheet that lists both the EPS rating computed for the proposed home and the EPS rating for a comparable home built to Oregon code minimum standards.[3] The goal is to educate realtors and consumers to the relative efficiency of homes and thus to transform market demand toward more energy-efficient homes.

ENGINEERING REVIEW

This task required a review of the methods used to model building energy use (as referenced in the EPS rating) and estimate measure savings to provide recommendations on reliability and appropriateness of the engineering estimates used. The first part of the review was to determine the types of measures that builders are currently using or might be expected to use in the future and to assess whether the modeling tools deal with those measures effectively. The second part of the task was to see how the savings estimates compare.

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2 See: http://www.energystar.gov/index.cfm?c=new_homes.nh_features.

3 Carbon score is computed and reported separately.

To provide a comparable rating of the proposed and the "ordinary" home requires definition of an appropriate base case. In this regard, the program recognizes that current practice is already slightly more efficient than the minimum allowed by Oregon code. For gas-heated homes, code requires a minimum 78% AFUE gas furnace and that 75% of lights be CFLs, whereas the market already has moved to a 90% AFUE furnace. Thus, the program assumes a 90% furnace is already present in the base case and allows a small tradeoff – reducing the amount of CFL lights from 75% to 50%.[4]

The staff provided a study sample of 59 new residential projects that have received an EPS rating. These represent the most recent projects that are expected to be typical of the program in the near future. Of those cases, data were incomplete for four cases, leaving 55 in the study group.

Achievement of ENERGY STAR® Status

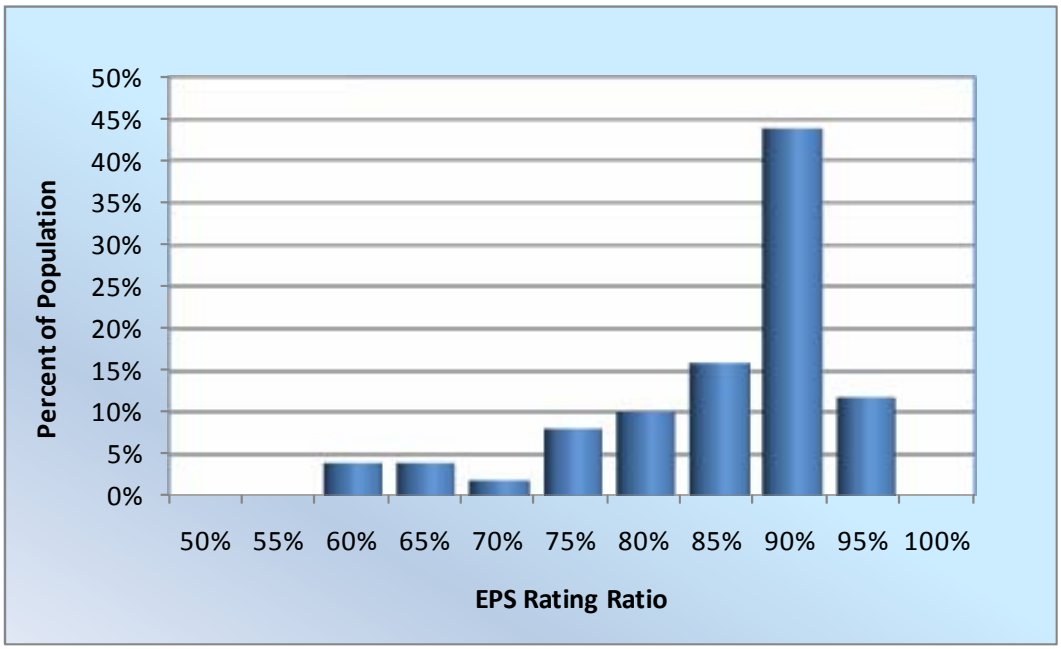
Six of the 55 projects studied (11%) failed to meet ENERGY STAR® certification requirements.[5] This is encouraging, as it indicates that efforts to promote the EPS rating will not dilute efforts to achieve ENERGY STAR® participation. According to program staff, builders are not likely to go through the process of submitting paperwork unless they are seeking recognition that will significantly enhance the salability of the home.

Since ENERGY STAR® is designed to achieve consumption that is 85% of a comparable code house, one would expect that, for the ENERGY STAR®-qualified homes, the ratio of the proposed EPS rating to the EPS rating for a code house (EPS rating ratio) should be at or below 85%. Indeed, the ratings for the qualifying homes averaged 82% of code. However, as Figure 2.1 shows, the distribution of the ratings ratio was well skewed and the median ratio was about 85%. The ratios for slightly more than half the cases are more than 85% – about 43% are at 90% and another 12% are at 95%. By contrast, some builders were able to achieve an EPS significantly lower than a comparable code home.

[4] In reality, all builders installed at least 75% CFLs anyway, which allowed them to claim additional savings for an increased incentive.

[5] Program records show all participants receiving incentives for ENERGY STAR® ratings or equivalent. The cases described here as failing to qualify are because review of the documentation showed either: (1) components were listed at less than ENERGY STAR® minimums; or (2) a tankless water heater was not verified as installed. The inconsistency could be due to a failure to update documentation, a failure to explain program requirements properly, or some other cause. This level of inconsistency in the records is not unusual, given the difficulty of maintaining documentation.

Figure 2.1: Frequencies of Cases by EPS Rating Ratio



Since the ENERGY STAR® prescriptive requirements were only expected to reach 85% *on average*, some variation might be expected. However, it is worth trying to determine the causes of the higher ratios. A significant reason is the addition of mechanical ventilation and the resulting energy consumption. The ENERGY STAR® requirements were developed without consideration of ventilation. In fact, since these homes are being leak-tested and sealed to a high level, it is necessary to add mechanical ventilation to assure adequate indoor air quality. The ventilation equipment adds energy consumption for the fan. In the case of the most common ventilation system – using the furnace fan – the increased energy can be a significant addition. The result is some degradation of the ratings ratio, even though the home meets the prescriptive ENERGY STAR® requirements for other components. Program staff are aware of this problem and are trying to educate builders in more efficient ventilation approaches.

Energy Savings Strategy Preferences

Table 2.1 shows how builders have responded to the program opportunities. Most builders have reached ENERGY STAR® compliance by constructing a tighter shell. This is not surprising, since previous educational efforts have focused on techniques to add more insulation. As a result, builders are more willing to consider this ENERGY STAR® Envelope path.

Table 2.1: ENERGY STAR® Compliance Cases

CONSERVATION STRATEGY	NUMBER OF PARTICIPANTS*	PERCENTAGE OF SAMPLE (N = 55)	AVERAGE EPS RATING RATIO**
ENERGY STAR® Envelope Path	39	78%	86%
Shell Partially beyond ENERGY STAR®	6	12%	63%
ENERGY STAR® Tankless Water Heater Path	5	10%	74%
Ducts Inside	3	6%	72%
Radiant Floor (no ducts)	3	6%	70%
Split Heat Pump (no ducts)	1	2%	61%
95% AFUE Gas Furnace	1	2%	70%
High Performance Shell	1	2%	79%
ALL PARTICIPANTS	**55**	**100%**	**82%**

* Some cases are in more than one category, so Table 1 sums to a number greater than the 55 cases.

** An 85% ratio is expected, since these cases all qualified for ENERGY STAR®.

The tankless water heater path is a new option for achieving ENERGY STAR® compliance. It is fairly easy for builders to install, as it does not require as much change in shell construction practices. The therm savings are large and result in a significantly lower EPS rating. In a few cases, a tankless water heater has even been included in homes heated by a heat pump. This is somewhat surprising because the home then incurs the costs of an additional utility service, even though the end-use consumption is small. This application of a tankless water heater may demonstrate the importance to builders of achieving ENERGY STAR® status.

Some emerging measures are still in the process of gaining market acceptance and were not yet popular with builders. Of interest are the attempts to move ducts inside conditioned spaces with a premium incentive. Only a few builders applied this technique in the study group. There is a time-lag in builders' response. Application of this measure requires intervention early in the design process so that architectural plans specify the changes in construction practice. Program staff report that some large developers have now started to incorporate these changes, so it may become more common with future program participants.

The other cases that received an incentive for "no ducts" are more problematic. The ratings for radiant systems are computed against a forced-air furnace base case. In fact, it is not clear that radiant heating is a cost-effective approach, given that it substitutes an 80% efficient boiler[6] for a 90% efficient furnace, even though there are possible duct savings. Thus, the radiant floor design should more appropriately be compared to a base case that is also a radiant floor. With such a

[6] This is the highest efficiency level boiler currently on the market.

consideration, the radiant floor system would not qualify for the "ducts indoor" incentive. Since there were only a few radiant systems, the modeling procedure for these systems is not clear. Some of the cases were granted a large savings for water heating without explanation. More development is needed to establish the appropriate base case – another radiant floor system, rather than a furnace system – and distribution of consumption across end-uses for these hybrid systems.

The mini-split system heat pump is another option that does away with ducts. The measure is emerging technology that may become more common in the future. At this point, the range of applications is not clear. Generally, one would expect that mini-splits will be limited to small homes that do not include multiple heating zones. If so, it could be questionable whether a full-size ducted furnace is the appropriate base case for comparison. However, the single example in the program is a two-story 2,000-square-foot home that does not appear to be limited by zoning considerations. In this example, assuming a ducted furnace for the base case alternative is reasonable. Thus, a decision on modeling assumptions should be postponed there until more examples of min-split systems to determine what construction practices apply.

There were two other examples of emerging technology beyond ENERGY STAR® requirements. One case was a 95%-efficient gas furnace; the other was construction of a High Performance insulated shell. In both cases, only one participant attempted the premium measure. It should also be noted that about one quarter of the participants found it possible to build partially better than the ENERGY STAR® standard, although not up to the full High Performance standard.

Program staff are interested in another emerging option that builders have not yet utilized. If one designs a home with a High Performance shell (perhaps utilizing passive solar features), it might be possible to forgo ducted systems entirely and allow the use of resistance electric heat on those rare occasions when a backup heater is required. This would be another case in which a "no ducts" design might be worthy of a premium incentive.

Use of Measure Tradeoffs

Builders are allowed flexibility in trading off one measure for another; yet such a tradeoff appears to have been proposed in only two cases (4% of the sample). Although the energy calculation approach needs to have the capability to allow tradeoffs, that capability is unlikely to be frequently used.

Reduction of EPS Ratio

In addition to showing the relative popularity of energy-efficient measures, Table 2.1 also shows the effectiveness of these choices in reducing the EPS rating ratio. A few builders were able to come in at 60% to 70% of code. Thus, it is clearly possible for builders to achieve better-than-code and even better-than-ENERGY STAR® level efficiency.

Factors Affecting Calculation of EPS

Several factors affecting the accuracy of the EPS calculation are relevant to this program, specifically:

- **Alternative construction practices and components** – such as custom homes of unusual design, inclusion of components that exceed program requirements, use of indoor ducts, and possible tradeoffs of advancing one measure to be more relaxed on another measure.
- **The impact of buffer spaces –** as overall energy consumption decreases, there is increasing interest in quantifying offsetting impacts in buffer spaces. For example, heat lost from ducts may moderate the temperature in crawl spaces and reduce heat loss through the floor. This offset may be small in leaky, older homes, but more important in newer, tighter homes. The amount of offset may play an important role in the value of projected savings due to PCTS (Project Closure Tracking System) tests to minimize duct leakage.
- **Internal gains due to lights, appliances, and occupancy** – as homes become tighter, internal gains become relatively more important in their contribution to offset space heating. For example, reducing electric consumption with CFLs will increase the amount of space heating required.
- **Seasonal variations in equipment performance** – heat pumps, in particular, are known to have variation in seasonal performance that can be greatly changed by proper installation and commissioning practices.

MODELING APPROACH

Types of Estimation Tools Compared

Program staff currently use REM/*Rate*™ as a tool to estimate the energy savings relative to a code-minimum house. The tool is preferred because staff members are familiar with it and they have built component libraries for evaluation of shell measures. It is understood that REM/*Rate*™ does not provide an accurate assessment of heat pump performance in the Pacific Northwest. Staff have developed a post-processing spreadsheet that adjusts energy consumption. The adjustment factors are ratios based on prototypical modeling examples run against estimates generated by the Northwest ENERGY STAR® program.[7] Thus, the estimating method used by the Northwest ENERGY STAR® program remains a calculation alternative.

[7] See: *http://www.northwestenergystar.com/*.

The most recent modeling supporting the Northwest ENERGY STAR® methodology has been built around the Simplified Energy Efficiency Model (SEEM), built for the Regional Technical Forum to incorporate detailed analysis of duct leakage and seasonal equipment performance into Ecotope's SUNDAY tool. Although SEEM is not "user friendly," the Northwest Planning and Conservation Council (NWPCC) has released a spreadsheet "front-end" that runs the SEEM program and allows for detailed specification of components. The methodology behind SEEM has been reviewed within the processes of the Regional Technical Forum (RTF) and thus represents some expert consensus. Its primary advantage is better quantification of seasonal equipment performance and buffer space interactions, which allows it to explicitly handle such issues as heat pump controls or duct leaks to buffer spaces. The current spreadsheet does not include options for mechanical ventilation. However, it is estimated that it would take about one month to refine the spreadsheet for program use with similar ease of use as REM/*Rate*™.

Neither tool adequately deals with radiant floor systems. To thoroughly analyze radiant systems requires developing models that include ground-coupled slab losses, hydronic pump and piping losses, alternative control strategies, and so forth. This would be an expensive development task. Since these systems are a small portion of the market, further development may be a low priority.

Both methods apply similar assumptions for some end-uses that are *deemed* – that is, end-uses for which standard values are applied for water heating, lights, and appliances, where actual consumption for a "real-world" family can be quite variable.

Method of Comparing Estimation Tools

To compare the estimating tools, it was necessary to define some simplified cases for analysis. We worked with program staff to develop comparable modeling runs. For this purpose, we looked at the prototypical house that was analyzed in developing ENERGY STAR® requirements and we limited the models to homes without mechanical ventilation. (This is a consideration because the inclusion of sub-optimal ventilation can be an energy drain. Since SEEM did not track that measure, we compared results for the no-ventilation prototypes.) The results that follow are based on SEEM analysis done in preparation of the Oregon ENERGY STAR® prescriptive measures.

One initial consideration is to verify the adjustment factors being applied to REM/*Rate*™ results. Figure 2.2 shows the ratios needed to adjust REM/*Rate*™ results to SEEM results. All data points are the ratio of kWh for heat pump to the kWh for electric thermal. The y-axis plots the ratios developed by staff and currently used in the program. The x-axis plots the ratios developed for this specific prototype house. The comparative ratios are computed for a variety of efficiency levels and climates. If there were perfect agreement between the two approaches, the data points would align along the 45-degree reference line. (Note that this is not a linear regression curve fit line.) As is evident in Figure 2.2, there is good agreement between these approaches. Therefore, one can apply the two calculation procedures to compute comparable EPS rating numbers.

Figure 2.2: Heat Pump Adjustment Factors

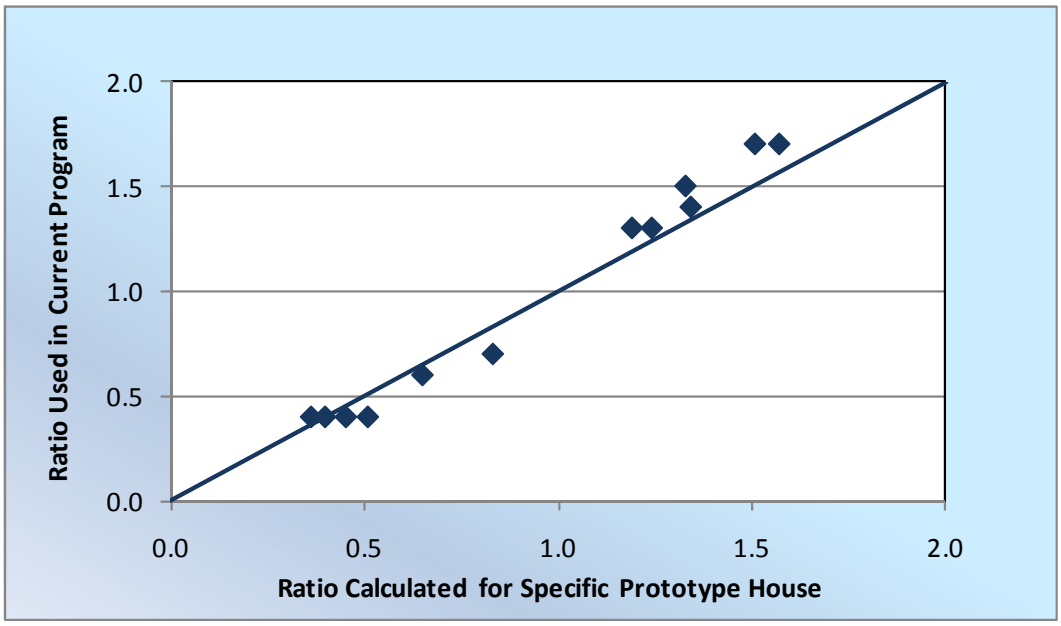
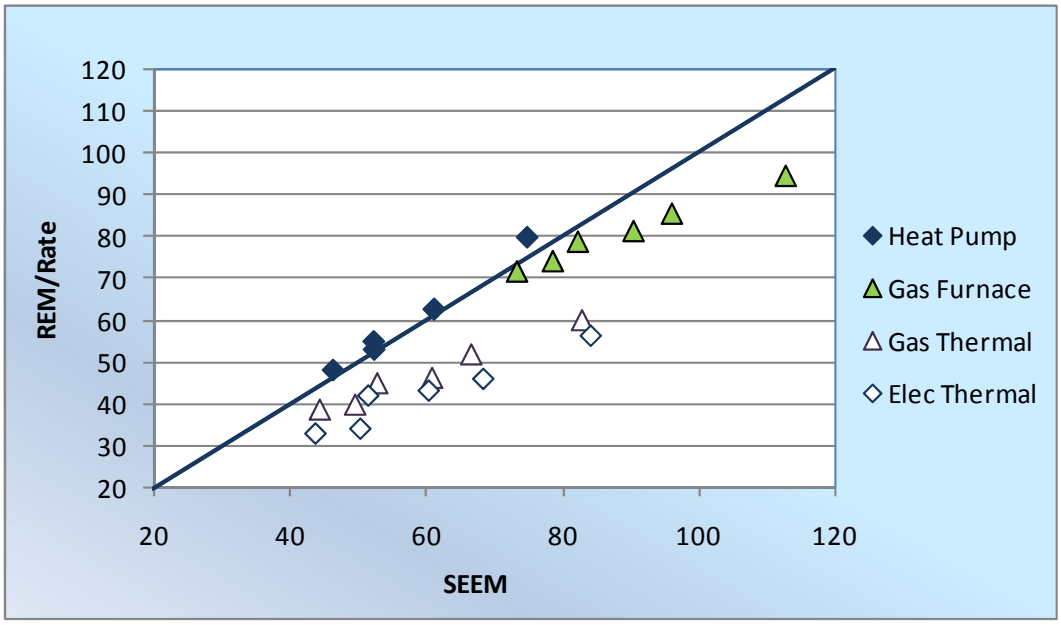


Figure 2.3 shows such ratings computed using either REM/*Rate*™ with heat pump adjustments or SEEM. Once again, good agreement between the methods would result in the data points aligning along the 45-degree line. With the adjustments, the heat pump ratings from the two methods are comparable.

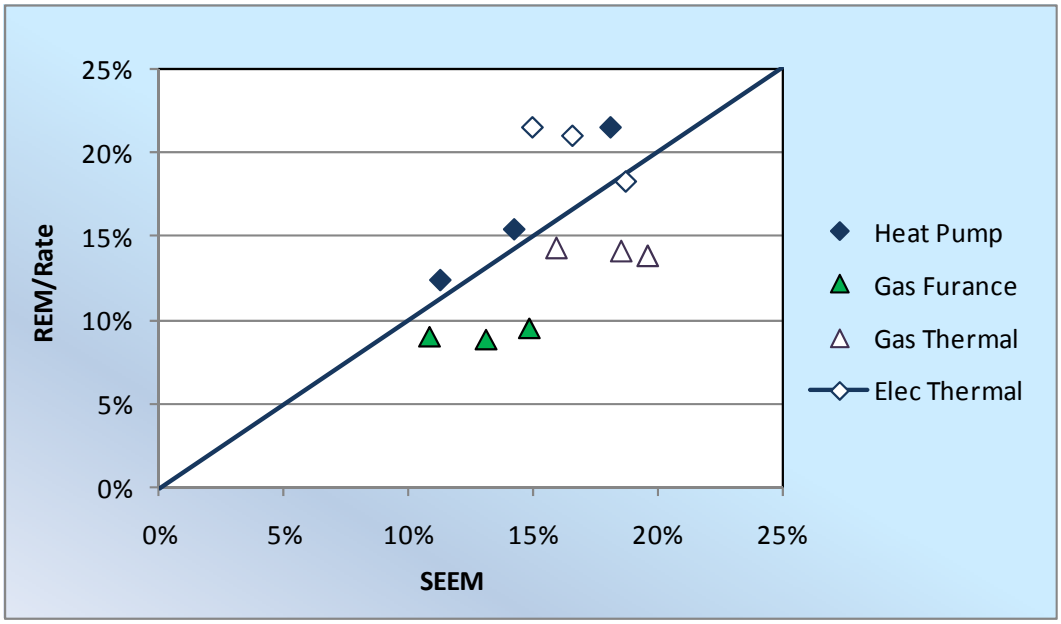
Figure 2.3: REM/Rate Compared to SEEM



However, the REM/*Rate*™ gas furnace ratings do not show as good agreement with SEEM values – there is a slight offset. To investigate further, we looked at just the thermal energy used for space heating alone, without any adjustment factors. In electric and gas cases, these results showed the same sort of offset.

If one looks at relative savings, that is, the percent difference between an efficient home and a code home, the effect is even more pronounced. Figure 2.4**Error! Reference source not found.** shows that the adjustment factors result in good alignment for the heat pump cases. However, the gas furnace cases and the unadjusted thermal energy are not in good agreement. REM/*Rate*™ computes a relatively similar percent savings for all the climate zones, whereas SEEM shows climate-related differences. This discrepancy is a problem because it was thought that, even if the tools have some slight bias, the relative differences between homes (that is, the savings) would be similar.

Figure 2.4: Percent Savings Comparison - REM/Rate vs. SEEM



Without a thorough evaluation of the modeling algorithms, it is difficult to account for the differences in modeling results. REM/*Rate*™ with post-processing is adequate for heat pumps. It is conservative for gas furnaces. However, it has been suggested that REM/*Rate*™ does not deal with the issues of buffer spaces as thoroughly as SEEM. Since it is not climate responsive and apparently does not allocate distribution losses well, REM/*Rate*™ may not accurately assess specific measures.

Ideally, models should be verified against the utility records of some recently constructed homes. There is such a project underway at Portland Energy Conservation Inc. (PECI), but results are not yet available. In the past, verification studies have found it difficult to reconcile “real world”

complications, such as varying rates of occupancy or changes in appliance loads, so accurate verification may not be possible.

3 PROCESS EVALUATION METHODOLOGY

Data for this evaluation comes from a review of program documents and in-depth interviews conducted with Energy Trust staff and contractors, homebuilders, and manufactured home retailers, as well as brief conversations with manufacturers. The interviewer took detailed notes in each interview, in some cases using a recording of the conversation for backup. The same staff member then performed a qualitative analysis of the interview data using a special software package that allows the user to establish project-specific codes and to associate any response or part of a response with one or multiple codes. This chapter provides details of the population and sample of each group interviewed, as well as the key information that the evaluation team gained from each set of interviews.

PROGRAM STAFF

The evaluation team interviewed 12 individuals involved in program implementation. Among those 12 individuals were representatives of each of the organizations involved in implementing the New Homes program. Table 3.1**Error! Reference source not found.** shows the population and the number of individuals interviewed from each organization.

Table 3.1: Program Staff Interviewed

ORGANIZATION	ROLE	NUMBER OF STAFF INVOLVED IN NEW HOMES PROGRAM	NUMBER OF STAFF INTERVIEWED
Energy Trust	Program Sponsor	3	3
PECI	Program Management Contractor	5	4
CSG	Technical Assistance	3	1
Earth Advantage Institute	Building Outreach Specialists (Site-built homes)	7	2
APT	Field Representatives (Manufactured homes)	2	2
TOTAL		**20**	**12**

Through these interviews, the evaluation team explored staff roles and communication structures, as well as program direction, strategies, and anticipated changes. The evaluation team also asked program staff for their insights into program challenges, market barriers, and opportunities. Finally, the evaluation team asked program staff what types of information they

would like to gain from participants to guide the development of questionnaires for homebuilders and manufactured home retailers.

PARTICIPATING SITE-BUILT HOMEBUILDERS

The evaluation team conducted in-depth interviews with 18 of the 63 site-built homebuilders that had participated in the program as of October 2009. We divided the list of 63 builders into three groups, based on the distribution of builders by number of homes built in 2009: 6 *large* builders had constructed five to twenty homes in 2009; 14 *medium*-sized builders had constructed from two to five homes; and 43 *small* builders had constructed only one home in 2009.

In addition to wanting feedback from a variety of builder types, we were interested in geographic coverage. Therefore, we classified builders by location in the state. Because there were so few large builders identified and they represent a large portion of the market, we attempted to interview all large builders, regardless of location; since five of the six large builders were located in the Portland Metro area, a wide geographic distribution would not have been possible in any case. Our other goals were to speak with at least one medium-sized builder and two small builders in each region. As Table 3.2 shows, we achieved those goals.

Table 3.2: Interviewed Builder Types by Geographic Location

BUILDER TYPE	NUMBER OF BUILDERS INTERVIEWED				
	PORTLAND METRO	NEARBY COUNTIES	EASTERN OREGON	WESTERN OREGON	TOTAL
Large	3	0	1	0	4
Medium	1	1	1	1	4
Small	2	2	3	3	10
TOTAL	**6**	**3**	**5**	**4**	**18**

The evaluation team chose to use interviews rather than a survey of homebuilders because, with a population of 63, a sample offering 90/10 confidence/precision would have required interviewing more than two-thirds of the population. Such a large sample would have been difficult and costly to achieve, and more in-depth interviews with a smaller sample yielded comprehensive information, as well as allowing us to explore issues with the respondents as they arose during the interviews.

Interviews with site-built homebuilders explored: the impact of the economic downturn on the homebuilders' businesses and their approach to the market; homebuilders' reasons for participation and interaction with BOSs; homebuilder reactions to the EPS rating system; the choice of measures homebuilders used to achieve energy savings; and homebuilders' experiences with program processes.

PARTICIPATING MANUFACTURED HOME RETAILERS

As of October 2009, about 47 manufactured home retailers had participated in the program. Several of those had multiple unique retail locations. As was the case with participating homebuilders, interviewing a large enough sample of manufactured home retailers to achieve 90/10 confidence/precision would have been difficult and costly, requiring interviews with more than half of the population. As a result, the evaluation team completed open-ended interviews with 13 manufactured home retailers. Of those, 12 completed the questionnaire, while one ended the interview with approximately 80% of the questions complete.

The retailers interviewed were sampled to ensure that both large and small retailers would be represented, based on the number of homes for which each retailer had received sales incentives. Six of the 13 retailers interviewed had received incentives for nine or more homes, while the remaining 7 retailers had received incentives for five homes or fewer. In addition, we sought to interview retailers from all parts of Oregon, with 7 of the interviewed retailers coming from areas west of the Cascades, 4 retailers from areas east of the Cascades, and 2 retailers from the Portland area.

Interviews with manufactured home retailers focused on characteristics of Oregon's manufactured homes industry, including: the market penetration of energy-efficient homes; retailers' promotion of energy efficiency; retailers' perceptions of their customers' views regarding energy efficiency; communication with program staff and program offerings; and retailers' experience of program processes.

MANUFACTURED HOME MANUFACTURERS

The manufactured home retailers involved in the program sell homes produced by twelve manufacturers, nine of which operate manufacturing facilities in Oregon. Two of those nine manufacturers operate dealerships and were included in the population of manufactured home retailers. The evaluation team included additional questions to probe the views of these respondents, as the two manufacturers in interviews focused on their experience of the program as retailers.

In addition, the evaluation team conducted brief interviews with five of the seven remaining manufactured home retailers with manufacturing facilities in Oregon. These interviews focused on their views of the potential for the program to provide incentives to manufactured home manufacturers, including the importance of meeting price points and the potential for manufacturers to track whether a home is placed within Energy Trust's territory.

4 RESULTS – SITE BUILT HOMES

The interviewed homebuilders ranged from those that typically construct 1 to 2 custom homes per year, to non-profit low-income housing builders, to school vocational programs, to spec builders that construct over 20 homes per year.

CHARACTERISTICS OF THE SITE-BUILT HOMES MARKET

As of November 10, 2009, there were one million qualified ENERGY STAR® homes in the United States; about 100,000 new homes earned an ENERGY STAR® rating in 2008. In Oregon, 899 homes out of the 7,385 built in 2008 qualified for ENERGY STAR® certification, for a market penetration rate of about 12%.[8] This rate puts Oregon at the 45th percentile in the nation in terms of market penetration. However, Oregon has some of the strictest buildings codes in the country; many homes that do not qualify for ENERGY STAR® in Oregon would qualify in other states. Program staff reported that market penetration in their territory was about 16% in 2009.

The Role of the New Homes Program in the Market

The Energy Trust program in the past year tried to push builders to exceed Oregon ENERGY STAR® standards. Even though a builder in the Energy Trust program theoretically can receive incentives for being below ENERGY STAR®, this only happens in about 10% of cases according to the measure review performed (see Section 3). Furthermore, program staff and builder interviews suggest that very few homes are not ENERGY STAR®. As one program staff person stated:

- *"We consider ENERGY STAR® the baseline… we are trying to lead [builders] to high performance homes with ducts inside, window reductions, and use of alternative energy."*

The Effect of the Economy

The economic downturn of 2008 and 2009 hit Oregon builders hard and consequently affected the New Homes program. The Oregon Department of Economic Analysis reported an estimated

[8] Note that 808 of these homes were part of the Energy Trust program. We assume the remaining 91 homes were outside of Energy Trust territory and therefore not eligible for this program. Furthermore, Energy Trust covers about 83% of the state, so approximately 6,130 new homes were built in Energy Trust territory in 2008.

37% decline in housing starts from 2008 to 2009.[9] As of June 1, 2009, there were only 173 ENERGY STAR® homes constructed since the beginning of the year in Energy Trust Territory, for an annualized amount of 415, assuming the same amount of homes constructed in the first five months of the year gets constructed in the second half.[10] This indicates that about 11% of all houses built in Energy Trust territory in 2009 will at least be ENERGY STAR®-certified.[11] The measures review indicates that Energy Trust program participants, on average, exceed ENERGY STAR® standards.

Our interviews suggest that all responding builders – barring three low-income housing builders and three small, predominantly custom, homebuilders – had to change their business model, reduce their rate of construction, take a loss on the sale of at least one house, and/or layoff staff. One builder that used to have 45 staff is now down to two. Another builder mentioned that he lost money on the sale of his most recent project and he was not planning on building for another year. A large builder mentioned that his business was down 80% from a year earlier and that his company was switching to multifamily projects to keep afloat. Yet another builder indicated he is building smaller houses now than he was a few years ago. In addition, a builder that used to solely do residential construction of five to seven houses per year had to change focus to remodeling and light commercial work to maintain his business.

While the economic downturn sharply affected most builders, two sectors of the building industry did not see a sharp downfall in business. Low-income housing builders and small, mostly custom, builders indicated their building rates were similar or only slightly down from previous years. A low-income housing builder indicated they are building about the same number of houses per year, but more families had applied for housing than in years past. However, these additional applicants failed to meet employment and other requirements of the housing program. Another low-income housing builder indicated he was almost immune to the market forces of the wider building industry because his houses are subsidized by public agencies that try to meet the demand for affordable housing. If there has been any change in this submarket, it is that demand has increased for affordable housing.

Three of the small builders we interviewed were not widely affected by the economic downturn because they do only one to two homes per year and have customers that specifically request their designs and expertise in building energy-efficient "green" homes. One of these builders stopped taking orders for houses about five years ago so he could work through his obligations

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9 Oregon Office of Economic Analysis. *www.oregon.gov/DAS/OEA/docs/economic/econdata/other-annual.xls*.

10 From 2006 to 2009, housing starts in the first two quarters of the year have consistently been 54% to 57% of the housing starts for the entire year. Source: Oregon Office of Economic Analysis. *http://www.oregon.gov/DAS/OEA/economic.shtml*.

11 This estimate could be flawed, as there may be more housing starts in the latter half of 2009. Program staff report they are approaching 16% market share.

and retire this year. Another builder also only works on order, not on spec, so he has a list of customers to work through one at a time. Additionally, this builder also does remodeling work, allowing him an extra revenue stream that is not as affected by the mortgage and housing industry. Yet another small builder actually started his business in the middle of the economic downturn and has completed two houses, with one selling within 60 to 90 days of completion – which is far better than the nine months or more that some builders endured.

Program staff saw this downturn in business as an opportunity for builders to join the program and hone their efficiency skills so that when building picks up again, builders will be positioned to take advantage of the program. One program staff person stated:

- *"Progressive builders have turned to the program more in the last year or two. Some were not looking at what they could do better [when there was a building boom] and the slowdown has allowed builders to look more for things to separate themselves from other builders."*

It is not clear from the builder interviews that builders saw the program as an opportunity. When asked if their focus changed as a result of the economic downturn, not one builder stated they tried to make their houses more energy-efficient. Rather, builders talked about making homes smaller to make them more affordable, building multifamily units instead of detached homes, and constructing fewer units. However, 10 of the 18 builders indicated they became aware of the program within the last two years, which is consistent with the timing of the economic downturn and new outreach efforts initiated by program staff. Only two participants indicated they learned of the program in the last 3 to 4 years, and six mentioned they were part of the program since inception.

PROGRAM MANAGEMENT AND ADMINISTRATION

Program Outreach

The majority of builders were attracted to the program through outreach efforts by the Builder Outreach Specialist (BOS) assigned to their area, while a few learned about the program through their interaction with their subcontractors, other builders, or affiliations with agencies or associations. Builder outreach is done whenever a builder files a permit with one of the 29 permit offices in Oregon. Each month, the program receives a list of new permit holders and the BOSs contact those builders to see if they want to participate in the program. This allows BOSs to contact all active builders in the state and provides the program with the opportunity to influence designs and measures of the house. The BOSs assist builders in identifying savings opportunities; program staff reported that very few builders achieved less than ENERGY STAR® savings levels, which the engineering analysis confirmed.

What we heard from builders regarding the economy was echoed by program staff in relation to outreach efforts. Program staff described a changed building market, with fewer large builders constructing on speculation in subdivisions and more small builders constructing custom homes

on in-fill lots. Although the program is on pace or close to meeting its annual goals for number of houses certified, the changes in the economy and the resulting changes in the program required a change in strategy from concentrating outreach efforts on large builders to small builders. This change means that program staff have had to alter how they do outreach and their program pitch. The program has to contact more builders to attain comparable numbers of program homes. As indicated below, however, our interviews suggest that small builders are more willing to "push the envelope" in energy efficiency measures, thus getting more savings per house than large production builders (see *Reasons for Builder Participation*, below).

Program Communication and Coordination

The New Homes program requires communication and coordination among multiple entities. Energy Trust, PECI, CSG, and Earth Advantage all have their own organizational structures and internal processes to manage, as well as coordinate with their partner entities. Therefore, we inquired about possible communication challenges. Respondent interviews indicated that communication problems are kept to a minimum among these groups. Furthermore, communication between program staff and builders was seen as consistent and problem free according to all builders except one (see *Builder Satisfaction*, below).

All program staff mentioned that regular meetings were helpful to keep one another abreast of new information and resolve issues in the field. Program management staffs from PECI, CSG, and Earth Advantage meet weekly, which was described as "helpful." Previously, some program staff felt that communication was difficult between Earth Advantage staff and PECI/CSG staff because, while PECI and CSG are located in the same area of downtown Portland, Earth Advantage offices are in Tualatin and the BOS's are scattered across the state. This initially led to some miscommunication and misunderstandings, but that issue has been resolved through the weekly meeting/conference call and monthly meetings.

In addition to weekly program manager meetings/conference calls, Energy Trust has a monthly status meeting with all program staff. This was described as "the primary contact" for all parties, where Energy Trust staff provide program updates, accomplishments are shared, and any issues that affect the program are discussed. This meeting also allows field staff to provide perspective to office staff about how builders perceive the program so adjustments can be made as necessary.

Respondents also reported regular communication with one another via phone and email to resolve issues or attain clarification from one another. For instance, a BOS might contact CSG staff for assistance in determining what BOP path a builder is taking if they are using zonal radiant in-floor heat. Or a BOS may seek reinforcement from program staff if a builder claims a higher R-value than the BOS determines. All respondents also indicated that their colleagues are responsive and helpful. One BOS stated, "I communicate with [office program staff] almost daily about EPS questions and data clarifications…The consultants [from PECI and CSG] always call me back."

BUILDER INVOLVEMENT

Reasons for Builder Participation

Builders participate in the program for a variety of reasons. Low-income housing builders are attracted to the program because they want to provide a house that will be inexpensive to operate for the homeowner. Schools are attracted to the program because they want to teach their students the latest techniques and designs in homebuilding. Both small custom builders and larger builders are interested in the market distinction that program participation offers – both groups view energy efficiency as an important marketing point in selling new homes. The latter group, however, was more explicit about the importance of the program incentives in allowing them to offset the costs of improved efficiency; they viewed the portion of the additional cost that was not covered by the incentives as a worthwhile marketing cost. For instance, one medium builder stated, "We get a good portion – 75% of costs – back due to energy efficiency incentives. The 25% of the cost that comes out of our pocket helps us sell the home."

The small builders, firms that construct one to two homes per year, were more likely to indicate that they already had identified and pursued efficiency as an important market niche for them, although they did not necessarily explicitly state that they would be able to pursue as much efficiency as they did without program incentives. When asked how important energy efficiency was to him and the potential homebuyer, one small builder indicated that efficiency was very important to him, yet stated that "people will not pay for it." Another stated that, "Energy efficiency gets people in the door, [but] fixtures, layout, and location sell the home.

Custom builders mentioned that their customers came to them because they are known for installing efficiency measures, as well as designing quality homes. These small builders are sought by customers that desire not only efficiency, but other green building techniques, such as renewable energy measures, water conservation, and use of sustainable materials. One program staff person characterized the work these small, mostly custom, builders do as "more a labor of love versus larger builders." This "labor of love" was evident during the interviews. One builder that recently started his own company stated he would only go into building if he could construct high-performance houses. Another builder demonstrated his commitment to building efficient houses by implying that all homes should be built to high standards of energy efficiency. While he likes and appreciates programs such as the New Homes program, he would rather all houses be highly efficient.

- *"I feel that many of these [incentive] programs have to be profitable and because they have to be profitable, they do not emphasize the right things. Energy efficiency needs to just exist…. The green industry is product-based rather than performance-based and that is too bad. Passive solar is more valuable than recycled carpets and bamboo floors."*

Alternatively, larger builders that construct on spec are more concerned with the cost of efficiency measures. While they may want to distinguish themselves from their competitors by

getting the ENERGY STAR® or Earth Advantage certificate, they draw a line as to how far they will go to make the homes efficient. As one contact put it, "bigger builders – they want to know how to get certified as cheap as possible." One large builder built only two homes that qualified for the program and had participated only because "I wanted my model homes to be top-of-the-line and this was a good way to get the home to a high standard."

Cost and other barriers are discussed further, below.

Builders' Understanding of the Program

While interviewing builders, it became clear that they do not speak the language of the program. For example, terms like Builder Option Packages (BOPs) are not necessarily known, and there seemed to be a lack of knowledge about whether they achieved savings equal to, above, or below ENERGY STAR® standards. Builders knew they qualified for incentives, but could not say they followed Builder Option Package 1 or 2, for instance. Respondents could list the measures they installed, but did not seem to have a clear understanding of what items or procedures provided incentives.

Some builders are familiar with the ENERGY STAR® program from previous program experience and think in terms like above and below ENERGY STAR® certification. But all builders seemed ignorant about how incentives are calculated or what exactly they received incentives for. One builder was explicit, stating, "I do not know what we got the incentives for." A BOS reported that builders do not come to the program with prior knowledge of how much of an incentive they could retain for installing certain measures:

- *"Builders are pretty clueless about the program when they first contact me or if I contact them for the first time. They rely heavily on [BOSs]. I never had a builder that knew anything about the program other than that it existed prior to contacting me."*[12]

All builders indicated they rely on their BOS throughout the course of a project – from the BOS consulting about what measures to include, to completing final paperwork. Some illustrative builder comments were:

- *"Ninety percent of the work was done by [the BOS]."*
- *"[The BOS] walked me through [the application]."*
- *"[The application process] was a little confusing but [my BOS] helped and it went fine."*

[12] The builders' difficulties are understandable: the evaluators had difficulty finding a clear explanation of the various energy-saving paths available to builders.

Use of EPS

Every builder indicated at least an awareness of the EPS, but there was a great deal of variation in how builders use or thought they may use the EPS. We learned that only four builders had any experience using the EPS in their marketing materials and all other builders were only able to hypothesize about how they might use the EPS in future projects. The four builders that did use the EPS only did things like attach the EPS flyer to existing home brochures. Builders have not used the EPS in broad marketing efforts or as a tool to help determine what measures to install in a home. However, builders were generally optimistic about future use of the EPS because "it seems like a better scenario than what we are used to because it 'dumbs' energy use down a bit for the customer."

All builders believe that the EPS will have more of an impact in three to five years when more people understand it and can use it to compare more houses. Currently, so few homes have EPS scores it is hard for potential buyers to compare. One builder stated "I think it will become more valuable as more people understand the EPS. In five years from now, it may be helpful as people recognize that it is like a mileage estimate for cars." However, another builder cautioned that "the EPS needs to be promoted in the general public" if it is to gain acceptance among homebuyers. One builder echoed this sentiment when he said "get the EPS into the media as much as possible to help educate the public. We had an article in the [local paper] that received a lot of attention…."

Projected use of the EPS varies among the different types of builders. School-based builders indicated they will fold the EPS into their curriculum. When asked if they thought the EPS would be a valuable tool in deciding what measures to include in a home, one school respondent stated, "It seems logical we might do that..." Low-income builders were less interested in marketing a specific home with an EPS score than they were in providing affordable housing. However, the EPS was not lost on this group of builders. Low-income builders will use the EPS to help them make decisions about what measures to install and thought that knowing the EPS score of one house would make them want to build a more efficient house the next time. "The EPS sets a bar for us and we want to see what we can achieve next time," said one builder. Other builders also thought they would use the EPS to drive future efforts. One small custom builder said "knowing the score, I think we could have built better than we did. On the last house we did some things really well, but there was room for improvement that I would try on my next house…" And large builders also indicated they may use the EPS as a decision tool in future projects albeit with a caveat. "There is a cost benefit analysis that has to go along with the EPS but it might be helpful in the future. But the cost has to come first."

Preferred Measures / Efficiency Paths

Envelope upgrades were the most popular route for receiving incentives. The primary reason was that envelope upgrades are the cheapest and least expensive way to attain incentives. A second reason was familiarity: envelope upgrades had been a part of the program before the introduction

of EPS. As one large builder stated, "I know the energy efficiency measures I like to use and continue to [use them]." Also, the envelope upgrade is the first and perhaps largest step in making a house more energy-efficient.

This is not to say that envelope upgrades are the only route followed. The low-income housing builders and the small custom builders made comments such as:

- *"We include everything energy efficiency we can in the house. We take conservation as far as customers will allow and have built our reputation on doing that."*
- *"We put as much energy efficiency as possible for… low income occupants that need to save on utility costs."*

A premise of this program design is that once the builder is in the program and has an established relationship with a BOS, the builder may be willing to install extra measures on the next home. This aspect of the program's theory received at least partial support: at least five builders plan on improving the efficiency of their future homes by moving ducts inside. Other builders mentioned they thought they could improve the efficiency of their next home through installation of other measures and planned on doing so.

However, some comments, particularly from large builders, indicated resistance to the use of measures that are not cost-effective. Several of the large builders made this point in particular in relation to tankless water heaters, saying that "tankless water heaters do not make sense [financially]" but that they would install them more often if higher incentives were offered to offset the cost. These builders included one who said that all of his houses include envelope upgrade measures to achieve the ENERGY STAR® rating.

Perhaps summarizing the sentiments about cost-effectiveness, one builder who was told by a program representative that savings from additional measures are minimal after insulation and air sealing wondered, "Does it make sense to pay lots to get that last 5% of savings? Should more incentives be put into renewable energy at that point?" Comments such as these suggest an opportunity to educate builders about the relative cost-effectiveness of energy efficiency versus renewable energy, as all measures supported through the program are more cost-effective than renewable energy measures.

Barriers to Installing More Efficiency Measures

Cost and perceived lack of consumer awareness or concern about energy efficiency were the primary barriers to installing more energy-efficient measures, particularly among the larger builders. Builders frankly stated that decisions about measures are made on a "case-by-case basis" and are installed only if they are cost-effective, making comments like "cost is the biggest issue" and "cost keeps me from going past the measures I use now."

Another commented that, "Buyers do not know what to look for and they are not willing to pay for energy efficiency." One builder stated that customers ask about energy efficiency about 15%

of the time, implying that other aspects of the home take precedence in a homebuyer's decision and, therefore, in his decision to build houses.

All respondents seemed to agree that, in general, homeowners do not emphasize efficiency when looking for a home. Even the small custom builders that appeal to buyers interested in "green" homes indicated that buyers are not knowledgeable about efficiency. That builder suggested that homebuyers should be involved in the inspection phase of the program so they can see the measures as they are installed and see what they are buying. This "would be good for spreading public knowledge of energy efficiency."

Two builders also indicated that the educational attainment of the homebuyer plays a role in how they value energy efficiency. One of these builders sold a house within 90 days of completion in a down-market because of the efficiency measures in the house. The homebuyer was an educated efficiency expert that liked what he saw in the house. The builder went on to say that his ten-plus years of experience in the building industry lead to him to the conclusion that "people that buy ENERGY STAR® houses seem to have master's degrees."

Builder Satisfaction

Participant builders are generally satisfied with the program. Builders held program staff and the paperwork process in high regard. Builders found it easy to schedule and coordinate inspections and found program staff willing and able to assist them with any questions they had about the application or paperwork. Moreover, most builders found the paperwork process easy because their BOS helped complete the paperwork (see *Builders' Understanding of the Program*, above). All builders indicated they would continue to participate in the program for the foreseeable future, except one who was retiring from the business.

Only two complaints were raised specific to program services. One builder was dissatisfied that it took several months to get the incentive. Another was dissatisfied with assistance received from program staff: the builder believed that he had provided the BOS with all necessary documentation to achieve an EAI platinum level, but then received paperwork showing that the home had been rated only as gold. Even though that builder was frustrated with the program office staff, he indicated that the field staff are "great." Both of those builders were among those who planned to continue in the program.

In addition, one builder noted that coordinating the requirements of the Energy Trust program and the Oregon High Performance tax credit program was an issue.

- *"It can be hard to juggle the Oregon High Performance tax credit program with the ENERGY STAR® and Earth Advantage programs. It is a lot to keep in your head. Also, Earth Advantage folks did not know what was going on with Oregon High Performance and vice-versa, which makes it hard to make sure you are satisfying all requirements."*

This comment is noteworthy in light of the fact that program staff identified one of the goals of this program as pushing more builders into the Oregon High Performance program. However, both program staff and BOSs mentioned challenges in communication and coordination with the Oregon Department of Energy (ODOE).

5 RESULTS – MANUFACTURED HOMES

The 13 manufactured home retailers interviewed ranged in size, with the smallest reporting that they would sell as few as 18 homes in a typical year, while the largest reported selling as many as 100 homes. Interview data suggests that sales of 30 to 50 manufactured homes per year are typical of retailers in Oregon, with about half of the interviewed retailers falling within that range. Contacts reported serving customers from all parts of Oregon, although about half stated that the majority of their customers come from an area within a 150 mile radius of the retailer's location. The remaining retailers did not report a precise enough area for their customer base to define a radius.

Program staff expect that the program will meet or come close to meeting its goals for 2009. Contacts stated that, although they had factored the economic downturn into their projections, both manufactured home sales and program participation had been slightly lower than expected. One contact reported that the program had received more applications for homes in Energy Trust's electric utility service territories than expected, while it had received fewer applications for homes in Energy Trust's gas service territories. This program staff member predicted that the program would fall slightly short of its overall goal of 278 homes.

CHARACTERISTICS OF THE MANUFACTURED HOMES INDUSTRY

Size and Composition of Oregon's Manufactured Homes Industry

The Oregon Manufactured Housing Association (OMHA) predicts that 740 manufactured homes will be shipped to Oregon retailers in 2009, down from 1,278 homes in 2008 and 2,495 homes in 2005. According to the OMHA, the vast majority of those homes come from manufacturers in Oregon and will be sold to Oregon customers. Estimates by the manufactured home retailers interviewed support the OMHA's assertion, with eight of the thirteen retailers interviewed reporting that 90% or more of the homes that they sell end up in Oregon, four reporting that at least 75% end up in Oregon, and one putting the number at 50%.

Market Penetration of Energy-Efficient Homes

Three of the retailers interviewed reported that they carry only ENERGY STAR® homes, five additional retailers reported that 90% or more of the homes they sell qualify, and three more said that at least 75% qualify. Of the remaining two retailers, one said that at least 50% of their homes were ENERGY STAR®-qualified and the other did not know. Two of those retailers reported that all of their display homes are ENERGY STAR® and that customers must special-order homes that do not meet that standard.

The retailers interviewed were less familiar with the Northwest Energy Efficient Manufactured Housing Program (NEEM) and the eco-rated labeling system than they were with ENERGY STAR®. Only two of the thirteen retailers interviewed reported having sold eco-rated homes. A third retailer, who reported carrying eco-rated homes, speculated that slow sales may have prevented the eco-rated label from becoming better known and that it may become more prevalent in the future .

Several of the retailers interviewed were not confident in their knowledge of the environmental and energy efficiency labeling systems available for manufactured homes other than ENERGY STAR®. While two retailers reported that they did not take part in NEEM or the Eco-Rated labeling system, five others expressed some confusion regarding the relationship between NEEM, ENERGY STAR®, and the eco-rated labeling system. Illustrating this confusion, one respondent stated:

- *"I remember reading about the eco-rated label and saying 'not another one.' How many programs can we get? It would be nice if it could stay in one or two areas and not confuse us."*

When discussing the differences between the labeling systems, another respondent said, "If no one asks me about it, I don't get further into detail."

Effect of the Economic Downturn

Consistent with the OMHA's prediction of reduced sales in 2009, all of the retailers interviewed reported that the economic downturn would negatively affect their sales. Retailer estimates for total 2009 home sales ranged from 4 to 50, with half predicting that they would sell between 30 and 50 homes in 2009. In addition, retailers reported that customers were willing and able to spend less money than they had in the past on manufactured homes and, as a result, customers were demanding smaller, less expensive homes.

The retailers interviewed also reported that some of their suppliers had gone out of business, driving up costs to the retailer. According to retailers, these increasing costs run counter to customer demand for less expensive homes and customers' expectation that manufactured home prices have fallen as real estate values have dropped. In addition, one retailer stated that falling real estate prices had allowed customers that otherwise might have purchased a manufactured home to buy a site-built house.

While all of the manufactured home retailers interviewed reported that they would sell fewer homes as a result of the economic downturn, the majority had not changed their marketing or the services they offered. Two retailers reported that they had shifted their marketing to focus on smaller, less expensive homes. A third retailer reported that they had begun focusing on selling homes over the Internet to draw customers from a wider area.

PARTICIPANT OUTREACH AND PROGRAM DELIVERY

Program Communication and Coordination

In general, the program staff members interviewed reported that internal program communications happen smoothly. The field representatives interviewed reported that they communicate with their manager as needed to answer day-to-day questions and that they have weekly meetings by conference call with PECI. PECI staff reported that these weekly conference calls provide an opportunity to hear updates on the manufactured homes industry from field representatives and to direct field representatives in the types of information the program would like to communicate to retailers. According to field representative contacts, the weekly conference calls cover PECI's programs for both manufactured homes and appliances, and the majority of the calls largely focus on issues related to the appliance program. However, the field representatives interviewed reported that other program staff members were receptive to input from field representatives.

While communication between the program implementation organizations was reportedly effective, there was a report that the program had faced difficulties in communication with the Oregon Department of Energy (ODOE), which houses NEEM.

Outreach to Field Representatives

The field representatives interviewed estimate that they work with between 55 and 60 manufactured home retailers across Oregon, and that those retailers make up the vast majority of all manufactured home retailers in the state.[13] Field representatives reach out to retailers and assist them with applications for coop marketing assistance and model home incentives. Field representatives also offer to train new employees at each manufactured home retailer.

The majority of the interviewed retailers reported that the program's field representatives visit them regularly to update materials, discuss the manufactured homes industry and strategies for selling more efficient homes, and to provide any other support the retailer needs, although two retailers reported that the frequency of visits had decreased recently.

Some retailers reported that they promote energy-efficient homes using techniques they have gained from years of experience in the manufactured homes industry, rather than any support or training that field representatives had provided. This is consistent with one field representative's observation that most salespeople receive training from manufacturers. That representative was unsure how valuable salespeople would find training from Energy Trust. However, the retailers generally reported that the field representatives were available to meet their needs and that they value the support that field representatives provide.

[13] OMHA lists 60 Oregon manufactured home retailers on their website.

Communication with Manufactured Home Retailers

Communication between the program and retailers was generally good. The majority of the retailers interviewed (8 of 13) reported that their communication with program staff had been effective and that, in their experience, the field representatives were knowledgeable about the industry. According to one, the field representatives provide "a market perspective as opposed to just a manufacturer's perspective." Ten of the 13 retailers reported that program staff were accessible when the retailer had a question or problem, 9 retailers reported that program staff were responsive to retailer requests, and 9 retailers reported that program staff were able to answer their questions or effectively resolve issues that they encountered.

Only a few communication challenges were noted, all of them by 3 of the 13 retailers. All apparently resulted from changes in the program's delivery over the past few years. Two respondents reported that the program had sent several different field representatives to work with his dealership. One of those retailers also stated that changes in staffing late in 2008 had made it difficult to resolve an issue regarding delivery of rebate checks. Program staff have acknowledged that there was a higher-than-normal staff turnover rate in 2008 and that there may have been some difficulty associated with replacement of the subcontractor that provided field representatives.

One retailer stated that their dealership had not received approximately $3,000 in sales incentives because a program cutoff date had not been effectively communicated to them. This retailer reported that their current field representative had apologized for the misunderstanding, but that the experience had "put a bitter taste in our mouth." Although deadlines are shown on the *Terms and Conditions* section of the application form, it may be worthwhile to show the deadline dates more prominently at the top of the form.

In addition to communication issues arising from program changes, two retailers reported issues with the way that field representatives had approached the dealership. One reported that they did not have time to meet with field representatives that arrive unannounced and requested that field representatives call the dealership rather than visiting unannounced, or at least call ahead to schedule a time to meet. The other reported that the field representative had continued contacting salespeople directly, even after being asked to contact the manager instead, although this issue was later resolved.

Two of the retailers who reported that field representatives were not knowledgeable about the manufactured homes industry stated that their current field representative seemed new to the industry. Both retailers emphasized that their field representatives were in the process of learning about the industry and stated that, despite the field representatives' relative inexperience, the support they provided was helpful. A third retailer suggested that the program should consider hiring field representatives who are already knowledgeable about the manufactured homes industry.

Concerns like the above may be what led one program contact to report that the industry perceived Energy Trust as an outsider, making it difficult for the program to build relationships within the manufactured homes industry and thus to influence manufactured home retailers and manufacturers, slowing program uptake.

Two retailers suggested ways that field representatives could better support manufactured home retailers. One contact suggested that field representatives could more effectively communicate with large retailers by contacting the retailer's regional manager and arranging to speak about the program at the retailer's managers meetings. A second suggested that it might be valuable for field representatives to visit the places where manufactured homes are being sited to welcome the new owners and provide them with information about energy efficiency.

Application Process

The mobile home retailers interviewed reported few problems with the program's application process. None of the interviewed retailers reported problems understanding or completing the application form itself. Only three of the interviewed retailers reported that they had sought help with the application process, usually for minor clarification or advice. In all three cases, the retailers interviewed reported that program staff had effectively answered their questions.

A few retailers reported problems with how applications were handled. Two reported that the program had lost or had not received information they had sent and that they had been required to send the same information multiple times. One of those also indicated disagreement with the program's decision that a home for which he had submitted an application did not qualify, but did not explain his reason for believing that the decision was incorrect. A third retailer's frustration concerned the fact that the program does not provide the sales incentive until the homebuyer is an active utility customer, while it typically takes as much as 90 to 120 days to finance, construct, and hookup a manufactured home, and sometimes may take as long as six months. The fourth reported difficulty resolving an issue with an application for coop advertising assistance (see *Cooperative Advertising Assistance*, below).

Incentive Process

The mobile home retailers interviewed were also largely satisfied with the program's incentive process. Nine of the interviewed retailers reported that their incentives arrived on time, although one retailer qualified his statement, saying that the incentives arrived on time once any program issues had been resolved. This retailer stated that he had waited more than a month before contacting the program and learning about issues with his application. Another retailer described the program as "slow to respond," saying that he would wait as much as a month after sending information without receiving a response.

RETAILER/MANUFACTURER INVOLVEMENT

Retailers' Promotion of Energy-Efficient Homes

Consistent with the high penetration of ENERGY STAR®-qualified homes, all of the manufactured home retailers interviewed reported that they promote energy efficiency as part of their sales pitch to customers. Those that carry only or primarily ENERGY STAR® homes reported that they use efficiency as a selling point, while other retailers reported that they encourage customers to upgrade the home to meet ENERGY STAR® requirements. The contacts reported that they are successful in up-selling energy efficiency to at least half of their customers. One emphasized the role of energy efficiency as a sales tool, saying, "…the ENERGY STAR® rating is nothing but an improvement on your ability to sell."

While all of the retailers interviewed reported discussing energy efficiency generally with their customers, four reported that they do not tell customers about the program and one other said that he tells the customers about the program "sometimes during conversation." Two reported confusion regarding the multiple programs available to customers and stated that they did not discuss specific incentive programs, focusing instead on general benefits of energy efficiency. Whether or not retailers told customers about the Energy Trust program was unrelated to the percentage of their homes that qualify for ENERGY STAR®.

Customer Demand for Energy Efficiency

All contacts reported that customers were interested in efficiency – most (8 of 13) called it a "significant" concern for customers, half of whom elaborated that energy efficiency was one of the most important factors that customers consider when buying a home. Five contacts reported that customers were interested in efficiency, though other concerns may take precedence.

Some retailers reported that customers were knowledgeable about energy efficiency and already knew that an efficient home would reduce their energy bills. One attributed this to long-term efforts to improve the efficiency of manufactured homes in the Northwest. Another reported that customers assume homes will come with energy-efficient features, saying:

- *"They are very educated as to what they expect when they buy a home. What we have to do is inform them that not all homes are ENERGY STAR® unless requested."*

Despite this general interest in energy efficiency, only four of the retailers said that their customers asked specifically about the impact that energy efficiency would have on their energy bills. One of those was explicit, that "customers would like to know actual figures." However, while one retailer said that the impact of energy efficiency on energy bills was part of his sales pitch, a few pointed out that they were unable to provide customers with accurate predictions of the impact that an energy-efficient home would have on their energy bills because a customer's energy use depends largely on the characteristics of that particular customer.

Changes in Customer Demand for Energy Efficiency

The retailers interviewed differed in their reports of whether customer demand for energy efficiency had changed in recent years. About half reported that customer interest in energy efficiency had increased in the past few years, one of whom reported that growing customer interest and the relatively small added cost of meeting ENERGY STAR® standards had led their associated manufacturer to design even their most basic models to be compliant.

Five of the retailers reported a high level of interest in energy efficiency, but that it had not changed in recent years. Only two reported that the economic downturn had made customers reluctant to spend extra money on an energy-efficient home. Another retailer reported an increase in sales of "spec" homes to investors planning to site the home and resell it. According to the retailer, these investors seek the least expensive homes possible and are not concerned with energy efficiency.

Customer Interest in Specific Energy Efficiency Features

The retailers interviewed reported that customers often ask for energy-efficient homes in general, without specifying specific energy-efficient features. In addition, some manufacturers provide energy efficiency upgrades as a package, including multiple measures. One retailer estimated that while 90% of their customers are interested in an energy-efficient home, only 15% to 20% ask for specific energy efficiency features.

While relatively few customers ask for specific energy-efficient features, the retailers interviewed stated that those customers that do request specific features most often ask about the home's insulation. One retailer reported that insulation is the area in which the retailer has the most impact on the home's energy efficiency, stating that customers may not always choose the most efficient appliances. Other measures that retailers reported their customers were interested in include lighting, heating, efficient windows, and increasingly, efficient water heaters.

Retailers' Responses to Program Offerings

Sales Incentives

Interviews with manufactured home retailers largely supported program staff members' assertion that the sales incentive motivates retailers to participate in the program. Ten of the 13 retailers reported that the sales incentive effectively motivates salespeople to promote energy-efficient homes, and half of the retailers reported that the sales incentive was the most valuable of all the program's offerings.

Program staff stated that they would like to provide the sales incentive directly to salespeople to create the greatest motivation to promote energy-efficient homes, but estimate that the sales incentive goes directly to salespeople only half the time. When the salespeople do not receive the payment directly, the incentive goes to the dealership, which may or may not share some portion

of the incentive with the salesperson. The retailers interviewed reported distributing the sales incentive in a variety of ways. Only three reported that the salesperson receives the full sales incentive, with three reporting that a set proportion of the incentive, from 25% to 50%, goes to the salesperson, and two reporting that they consider the sales incentive to be additional profit on the sale of the home, which is reflected in the salesperson's commission. The others reported that the sales incentive goes to the company or to purchase additional advertising. One contact reported that they do not provide the sales incentive to the salespeople, since the large majority of the homes they sell qualify for ENERGY STAR®.

Another, however, expressed an opinion that was consistent with program staff members' reasons for wanting the incentive to go directly to the salespeople: "If there was some way for the salespeople to derive something from it, I guarantee you would sell more efficient homes." One of the retailers that provide the incentive directly to the salespeople gave a similar justification, pointing out the key role that sales staff play in selling an efficient home. One retailer, in fact, had told the program multiple times that he wanted the incentive to go to the salespeople directly, but the paperwork had never been properly processed. This retailer reported that his company currently receives the incentive and then writes a check to the salesperson. Program staff have reported that the program has put a system in place to identify the appropriate recipient of the check.

Cooperative Advertising Assistance

Program staff, including field representatives, reported that the coop advertising assistance is very popular with retailers and that the program had been forced to limit the coop marketing funds available because high participation had depleted the program's coop marketing budget.

Just over half the retailers interviewed reported that they had received the assistance and three others reported that they would like to take part in that aspect of the program, but had not for a variety of reasons.

Those that had received coop advertising assistance found the assistance was valuable. They reported that the assistance had allowed them to advertise more frequently and to use more elaborate advertisements that would better catch the customer's eye. Retailers reported that customers are aware of energy efficiency and receptive to advertising focused on energy-efficient homes, and five explicitly said it had helped them sell more energy-efficient homes, while one other thought that it had been beneficial, but was unsure if it had led to sales directly.

Two of the retailers interviewed reported dissatisfaction with program processes relating to the advertising assistance. One reported that his field representative was out of the office when he called with a question and other program staff were unable to help him, instead directing him to his representative's voice mail. Ultimately, he decided not to pursue the advertising assistance in that case. Another was dissatisfied that funds were not made available until after the advertising was purchased; he was reluctant to purchase advertising without knowing whether limited program funds would be available, saying, "Until you get the check, there is no guarantee that

you are going to get the assistance…if you knew you were going to get it, you would probably do more advertising through the program."

Model Home Incentives

The program offers retailers incentives to display up to two ENERGY STAR®-qualified model homes per year; it also supplies items like brochures, welcome mats, and banners to draw attention to ENERGY STAR® and the home's energy-efficient features. The field representatives interviewed reported that, like coop advertising assistance, the model home incentive is popular with retailers.

Nine of the 13 interviewed retailers reported that they had received model home incentives. They largely felt that the incentive was valuable, reporting that the funds allowed them to promote the home's ENERGY STAR® qualifications to a greater extent than they otherwise would have. Several reported that the model homes themselves served as good advertising, serving as "templates" that customers would order from or examples to include in sales materials.

Speaking of the impact of model homes, a retailer said, "If we are quoting a price on a home the way they saw it and it already has ENERGY STAR®, then they will get ENERGY STAR®." Another, however, said that they would not include energy efficiency in their sales pitch to a customer interested in a model home that was not ENERGY STAR®-qualified for fear of losing the sale.

Training and Support

The retailers interviewed reported receiving training and support from field representatives, both in carrying out the program's participation processes and in providing salespeople with the information they would need to promote energy-efficient homes. While retailers were generally satisfied with the training and support they had received from the program, two suggested areas in which the program could provide additional support. One suggested that the program could provide basic information to build the customer's understanding of energy efficiency, and the second expressed a desire for more information on any tax credits or incentives that might be available for individuals purchasing a manufactured home, including incentives for appliances that may come with the home.

Barriers to Selling More Energy-Efficient Homes

Contacts reported that some customers could not afford the added cost of an energy-efficient home, despite the potential for long-term savings, and that it had become more difficult for customers to find financing, further limiting their ability to purchase additional energy-efficient features.

On the other hand, about one-third of the retailers stated that they did not face any greater barriers to selling efficient homes than they do to selling homes in general. Illustrating these comments, one retailer said,

- *"There is no barrier for us at all. I mean it has come to a place where I can't sell you a non-ENERGY STAR® home because the value is so great in how it is going to affect your energy efficiency. In good conscience, I can't sell one without it."*

Another retailer reported that they only sold homes that did not qualify for ENERGY STAR® when the customer wanted a model in which an ENERGY STAR® qualification would not be cost-effective, or when the home would be sited in a place that made ENERGY STAR®-qualified models impractical.

Targeting Other Market Actors

In addition to asking retailers about the value to them of the various types of program assistance, we explored the value of providing incentives to customers and manufacturers.

Incentives for Customers

In 2008, the program began providing incentives only to manufactured home retailers, rather than to customers. Program staff reported that it was difficult to work with customers and motivate them to participate in the program, and that participation has increased since the program began focusing on incentives for manufactured home retailers.

By contrast, the retailers interviewed continue to see value in incentives provided to the customer. Although the retailers were not directly asked about customer incentives, five retailers stated that the availability of customer incentives helped them sell more energy-efficient homes. In addition, one retailer reported that they offer the program's sales incentive directly to their customers, using it as a sales tool. Another stated that customer incentives are most effective when they are applied directly to the price of the house to reduce the amount financed.

Incentives for Manufacturers

Program staff reported that they had also considered providing incentives to manufactured home manufacturers. One contact stated that, ideally, the program would follow the model of the Bonneville Power Administration's Manufactured Housing Acquisition Program (MAP) that took place in the 1990s, seeking to transform the manufactured home market by targeting manufacturers. However, this type of program would require coordination between home manufacturers and multiple utilities. According to contacts, the program determined that it would be too difficult to track whether or not a home ended up in Energy Trust territory once it left the manufacturer.

To investigate the potential to provide incentives to manufactured home manufacturers, the evaluation team contacted five manufacturers with facilities in Oregon and posed additional questions to the two retailers interviewed who were associated with Oregon manufacturers. The contacts were asked whether they believed there would be value in changing the program to provide incentives to manufacturers and whether they would be able to track where the homes they produce end up.

All but one of the manufacturers interviewed reported that incentives would motivate them to produce more energy-efficient homes. In explaining their responses, four manufacturers referred to the MAP program, stating that it had been effective in increasing the prevalence of efficient manufactured homes. The manufacturers reported that incentives would allow them to include additional energy efficiency measures in the homes at a minimal increase in cost to the consumer, with one speculating that incentives may allow them to include measures that would not be cost-effective for consumers to purchase on an individual basis. The interviewed manufacturers stated that, as the current economic conditions lead to increasing costs of materials and increasingly price-conscious consumers, incentives for efficient homes would be especially beneficial. Note that we did not discuss the level of incentives, so manufacturer responses may have been based on an assumption of incentives comparable to those provided by MAP, which were considerably higher than those offered by the New Homes program.

Manufacturers also reported that they would be able to meet the program's requirements for tracking where homes are sited using their own records of homes sold directly to consumers and the State of Oregon's LOIS manufactured home tracking system.

Suggested Program Changes

Program staff are aware that ENERGY STAR®-qualified homes make up a large proportion of the market and suggested a variety of ways in which the program might encourage retailers to sell homes that go beyond ENERGY STAR® standards. One possibility would be to shift the program's incentive structure to promote eco-rated homes by reducing the sales incentive for an ENERGY STAR® home to $300 and paying for the upgrade necessary to qualify the home for the eco-rated label, a cost of approximately $700. Program staff also plan to monitor the prevalence of heat pumps and the popularity of very efficient homes like Clayton Homes' *i-house* to determine whether the baseline for energy efficiency in the manufactured homes industry is changing.

The retailers interviewed were divided in their opinions about the potential effectiveness of a tiered incentive structure. Five thought a tiered incentive structure would be effective, but only one explicitly stated that a tiered incentive structure would motivate them to promote additional measures, such as more efficient lighting and appliances.

Those who did not think a tiered incentive structure would be effective thought that, with no widely-recognized standard for energy efficiency beyond ENERGY STAR®, it would be difficult for them to promote more efficient homes. Illustrative comments were:

- *"With us, it's basically ENERGY STAR® or it's not."*
- *"Pretty much ENERGY STAR® is the greatest efficiency level we have and we strive to push that. So I wouldn't have a higher tier to push."*

Three retailers suggested that an incentive structure that was tiered, not on the basis of level of efficiency in a given home, but on the number of efficient homes sold might motivate them to sell more energy-efficient homes.

6 CONCLUSIONS AND RECOMMENDATIONS

Program participants are generally satisfied with the New Homes program, and program staff did not report any significant concerns with the current program. However, we believe there are actions that could strengthen the program and key points to understand.

MEASURES REVIEW

Conclusion: The current modeling tool may be limited in its ability to accurately calculate EPS ratings. Several factors affect the ability to calculate EPS, including alternative construction practices and components, the impact of buffer spaces; space conditioning; internal gains due to lights, appliances and occupancy; and the accuracy of seasonal equipment performance.

➡ ***Recommendation*: The modeling tool used to calculate the EPS rating needs certain capabilities.**

- Ability to easily allow for alternative construction practices and components
- Ability to calculate the impact of buffer spaces
- Inclusion of options for space conditioning equipment (meaning not only higher efficiency ratings on equipment, but also explicit calculations to quantify such measures as moving ducts indoors)
- Ability to quantify the internal gains due to lights, appliances, and occupancy
- Ability to account for seasonal variation in equipment performance

Conclusion: The adjustment factors used for modifying consumption in heat pump applications appear adequate. REM/*Rate*™ appears to have a problem computing the thermal requirements for conditioned spaces. For heat pumps systems, this is adequately corrected with the post-processing adjustment factors. However, the SEEM model, with the NWPCC spreadsheet tool, has the potential to replace REM/*Rate*™ with a similar ease of use.

➡ ***Recommendation*: Consider replacing REM/*Rate*™ with the SEEM**. The SEEM tool appears to be an alternative method that would improve the modeling accuracy. Some development work is needed, primarily to incorporate mechanical ventilation options.

Conclusion: There are reasons to think that radiant floor systems should not be compared to a ducted furnace base case. Neither of the tools reviewed deals adequately with radiant floor systems, but cost-effectiveness issues may make this a low-priority area**.**

➡ ***Recommendation*: The program should reconsider qualifications for "no duct" systems**.

PROCESS ANALYSIS: SITE-BUILT HOMES

Conclusion: The move away from the prescriptive ENERGY STAR® program to the customized EPS system allows builders greater flexibility, which is an asset of the program, but also makes the incentive structure opaque to potential new participants. BOSs are a critical link in the program, from assisting builders with paperwork issues, to consulting on what measures to include. We were surprised at how little participants seemed to know about how the homes were incented and what their options were for incentives.

➡ ***Recommendation*: Continue support for BOSs and provide them with tools to encourage participation, but also make incentives as transparent to builders as possible**. Provide clear and explicit explanations of qualifying measures and energy savings paths (BOPs) and make those explanations easily accessible on the program website and in printed collateral.

Conclusion: Some builders may have difficulty coordinating the requirements of the program and the Oregon High Performance tax credit program. One of the goals of this program is to push more builders into the Oregon High Performance program. If builders have a hard time getting the programs to mesh for them, however, this may be difficult.

➡ ***Recommendation*: Attempt to improve coordination between the New Homes program and the tax credit program**. Provide clear explanations – perhaps on the application itself –of how the program's requirements relate to those of the Oregon High Performance tax credit program. Note that the BOPs are designed to meet both the Energy Trust and tax credit program requirements. Continue to work with ODOE to make application to the tax credit program easy.

Conclusion: Some builders perceive resistance by customers to pay extra for energy efficiency. Greater consumer understanding of EPS may help create greater demand for energy efficiency. However, while builders indicate they like the EPS and think it will be useful, it has not been around long enough for them to have any experience using it in marketing, or as a tool to determine what measures to install. A related issue is that some builders may not be aware of the relative cost-effectiveness of energy efficiency measures supported through the program, compared to renewable energy measures.

➡ ***Recommendation*: Continue to publicize and market the EPS to the broad public using popular media outlets and other methods.** Include information about the relative cost-effectiveness of all energy efficiency measures supported through the program compared to renewable energy measures.

PROCESS ANALYSIS: MANUFACTURED HOMES

Conclusion: Retailers are committed to promoting energy efficiency in the homes that they sell, and coop advertising assistance and model home incentives provide them with tools that reinforce their efforts to sell efficient homes. The messages promoting energy efficiency that coop advertising assistance supports resonate well with customers

➡ ***Recommendation*: Continue to offer, and potentially expand, coop advertising assistance and model home incentives for manufactured home retailers.**

Conclusion: Retailers would likely promote ENERGY STAR®-qualified homes, even in the absence of program incentives; however, there is no widely recognized efficiency target for manufactured homes beyond ENERGY STAR®.

➡ ***Recommendation*: Build awareness among retailers and homebuyers of the eco-rated label or other labels signifying higher levels of energy efficiency than ENERGY STAR®.**

Conclusion: Changes in staffing and program offerings have led to communication challenges with manufactured home retailers and may have limited the program's ability to build relationships within the manufactured homes industry. This may have been more of an issue prior to the replacement of the subcontractor responsible for providing field representatives.

➡ ***Recommendation*: Continue to maintain consistency in staffing and strive for transparency in changes to program offerings.**

Conclusion: Retailers may be limited in their ability to customize homes for greater efficiency and to promote homes that exceed ENERGY STAR® standards, but manufacturers would likely be better able to build and promote homes that achieve higher levels of energy efficiency. Manufactured home manufacturers are able to track where a home is sited once it leaves the factory, which would eliminate one of the barriers that program staff reported had prevented them from providing incentives to manufacturers.

➡ ***Recommendation*: Consider offering incentives to manufactured home manufacturers.**

APPENDICES

A INTERVIEW GUIDE FOR ENERGY TRUST STAFF

Name _____

Company _____

Title _____

Date _____

Interviewer _____

1. What is your role in the Energy Trust Efficient New Homes program?

2. Can you describe for me how the program operates – that is, describe the program activities, including how builders are contacted?

   a. Site-built homes:

   b. Manufactured homes:

3. Can you describe the communication between Energy Trust and PECI?

   a. Do you have any direct communication with CSG?

      If so,

         What do you communicate about and how often?

   b. Do you see any actual or potential communication roadblocks?

      If so,

         [If respondent is involved with both site-built and manufactured homes:] Do they differ for the site-built and manufactured programs?

         How do you think they could be dealt with?

4. How has the program been going so far under the new code?

   a. At the project kick-off, it was noted that program activity has been slow because of the poor economy. Has there been any change since then?

   b. If it continues at the current pace, will it achieve its goals?

For site-built homes:

For manufactured homes:

c. If not, what are you planning to do about that?

d. Any other challenges so far?

5. I'd like to get some detail about the mix between large and small builders (for site-built homes), focusing on homes built under the new code. Can you provide that information or should I get that from PECI and CSG?

[If should get from PECI/CSG, skip to Q6]

a. What would define a large versus a small builder?

b. Are there two clearly identifiable groups, or is the number of homes per builder distributed along a continuum?

c. About what percentage of the work is being done by small builders?

6. About what percentage of the work is being done by large builders? Can you provide that information or should I get that from PECI and CSG?

[If should get from PECI/CSG, skip to Q7]

7. [If applicable] About what percentage of the work is being done by in-between builders? Can you provide that information or should I get that from PECI and CSG?

[If should get from PECI/CSG, skip to Q8]

8. I'd like to know a little more about what the builders are doing. Again, please let me know if someone from PECI or CSG can better tell me about this.

[If should get from PECI/CSG, skip to Q9]

a. At the kick-off, it was noted that several builders are using 2009 ENERGY STAR BOPS and going above ENERGY STAR. Can you give me a sense of the magnitude – how much above ENERGY STAR?

b. Based on your assessment, what are the most common BOPS being met? (That is, what are the most common combinations of measures used to meet BOPS requirements?)

c. What additional measures are commonly being installed that go beyond BOPS?

d. What measures are being installed that partially meet BOPS?

e. How does this compare to what you expected or wanted to get from the 2009 BOPS?

f. What feedback have you gotten, if any, on what additional measures or approaches builders are likely to or would like to adopt in the future (e.g., because they are cost-effective, attractive to homebuyers, and easy to install or carry out)?

9. Other than the economy, what do you think are the potential barriers to program success?

a. What are you doing to address these?

10. I'd like some more detail about how EPS is used in the program. Again, please let me know if someone from PECI or CSG can better tell me about this.

[If should get from PECI/CSG, skip to Q11]

a. Can you explain the current role of EPS?

b. Are there any plans to change how EPS is used? If so, what are they?

c. Have any issues come up with using EPS? If so, what?

d. How have those issues been addressed?

11. What kind of feedback would be helpful to get from builders about EPS?

a. What types of feedback do you think they might give?

12. What about real estate agents? Do you know if they are interested in using EPS to market new homes?

a. What, if anything, have you heard about how they do or might use EPS in their marketing?

13. Can you provide any details about the program's involvement with home tours or should I get this from PECI or CSG?

[If should get from PECI/CSG, skip to Q14]

a. How are the tours operated and by whom?

b. How are the tours used to showcase the EPS?

14. Can you provide any details about the program's coop advertising assistance for manufactured homes or should I get this from PECI or CSG?

    [If should get from PECI/CSG, skip to Q15]

    a. What is the total coop advertising budget?

    b. How is the assistance divided among the various manufacturers and retailers? (Probe: is it based on size, number of units sold, location, etc.?)

    c. What are the restrictions, if any, on how the assistance can be spent?

    d. What information do you have on how the assistance has been spent and the effectiveness of the resulting advertising?

15. Can you send me any information you have on the BOSs that are involved with the program? [If you do not have this information, who does?]

B INTERVIEW GUIDE FOR IMPLEMENTERS (SITE-BUILT)

Name _____

Company _____

Title _____

Date _____

Interviewer _____

1. What is your role in the Energy Trust Efficient New Homes program?

2. Can you describe for me how the program operates – that is, describe the program activities, including how builders are contacted?

3. Can you describe the communication between Energy Trust and PECI?

   Probe: What do you communicate about and how often?

   a. How about between PECI and CSG?

   b. How about communication with BOSs?

   c. Do you see any actual or potential communication roadblocks?

      If so,

         How do you think they could be dealt with?

4. How has the program been going so far under the new code?

   a. At the project kick-off, it was noted that program activity has been slow because of the poor economy. Has there been any change since then?

   b. If it continues at the current pace, will it achieve its goals?

   c. If not, what are you planning to do about that?

   d. Any other challenges so far?

5. The program's Implementation Manual describes your activities with trade allies (e.g., lighting, architect, design & engineering allies).

   a. Have there been any changes in your dealings with TAs that are not reflected in the manual?

   b. Have the program's dealings with TAs been useful?

   c. Have there been any challenges in dealing with TAs?

6. I'd like to get some detail about the mix between large and small builders (for site-built homes), focusing on homes built under the new code.

   a. What would define a large versus a small builder?

   b. Are there two clearly identifiable groups, or is the number of homes per builder distributed along a continuum?

   c. About what percentage of the work is being done by small builders?

   d. About what percentage of the work is being done by large builders?

   e. [If applicable] About what percentage of the work is being done by in-between builders?

7. I'd like to know a little more about what the builders are doing:

   a. At the kick-off, it was noted that several builders are using 2009 ENERGY STAR BOPS and going above ENERGY STAR. Can you give me a sense of the magnitude – how much above ENERGY STAR?

   b. Based on your assessment, what are the most common BOPS being met? (That is, what are the most common combinations of measures used to meet BOPS requirements?)

   c. What additional measures are commonly being installed that go beyond BOPS?

   d. What measures are being installed that partially meet BOPS?

   e. How does this compare to what you expected or wanted to get from the 2009 BOPS?

   f. It also was noted that inside ducts are popular. However, the measure review showed that only two of 52 new homes had inside ducts. Can you clarify what information suggests that they are popular?

   g. What other measures appear to be popular?

h. Are you finding anything else notable?

8. Other than the economy, what do you think are the potential barriers to program success?

   a. What are you doing to address these?

9. Can you provide a more detailed explanation of the program's involvement with home tours, such as the Ultimate Open House and the shows in Marion and Lane Counties, Bend, and Southern Oregon?

   a. How are the tours operated and by whom?

   b. How are the tours used to showcase the EPS?

10. I'd like some more detail about how EPS is used in the program.

   a. Can you explain the current role of EPS?

   b. Are there any plans to change how EPS is used? If so, what are they?

   c. Have any issues come up with using EPS? If so, what?

   d. How have those issues been addressed?

11. What kind of feedback would be helpful to get from builders about EPS?

   a. What types of feedback do you think they might give?

12. What about real estate agents? Do you know if they are interested in using EPS to market new homes?

   a. What, if anything, have you heard about how they do or might use EPS in their marketing?

[Q13 is for Marketing staff and manufactured homes staff only:]

13. Can you provide any details about the program's coop advertising assistance for manufactured homes?

   a. What is the total coop advertising budget?

   b. How is the assistance divided among the various manufacturers and retailers? (Probe: is it based on size, number of units sold, location, etc.?)

c. What are the restrictions, if any, on how the assistance can be spent?

d. What information do you have on how the assistance has been spent and the effectiveness of the resulting advertising?

[Q11 & Q12 for all interviewees:]

14. Can you send me the contact lists for program participants – both site-built and manufactured home, if you have them?

15. In the kick-off meeting, we were told that the program contacts builders primarily through BOSs. Is that just in the recruitment stage or do BOSs have continuing contact with builders after program recruitment?

16. Can you send me any information you have on the BOSs that are involved with the program?

C INTERVIEW GUIDE FOR IMPLEMENTERS (MANUFACTURED)

Name _____

Company _____

Title _____

Date _____

Interviewer _____

1. What is your role in the Energy Trust Efficient New Homes program?

2. Can you describe for me how the program operates – that is, describe the program activities, including how builders are contacted?

   a. Can you explain NEEM?

   b. Can you explain the role of eco-rated homes?

3. Can you describe the communication between Energy Trust and PECI?

   Probe: What do you communicate about and how often?

   a. How about between PECI and CSG?

   b. How about communication with BOSs?

   c. Do you see any actual or potential communication roadblocks?

      If so,

         How do you think they could be dealt with?

4. How has the program been going so far under the new codes?

   a. At the project kick-off, it was noted that program activity for the site-built component has been slow because of the poor economy. Is this also the case for manufactured homes?

   b. If it continues at the current pace, will it achieve its goals?

   c. If not, what are you planning to do about that?

d. Any other challenges so far?

5. What recent innovations have there been in manufactured homes that might affect the program, such as new types of heating systems?

   a. How would they affect the program?

6. Other than the economy, what do you think are the potential barriers to program success?

   a. What are you doing to address these?

7. Is there any plan to change the incentives or who receives them (e.g., salespersons or manufacturers)?

   a. Why or why not?

8. Can you provide any details about the program's coop advertising assistance for manufactured homes?

   a. What is the total coop advertising budget?

   b. How is the assistance divided among the various manufacturers and retailers? (Probe: is it based on size, number of units sold, location, etc.?)

   c. What are the restrictions, if any, on how the assistance can be spent?

   d. What information do you have on how the assistance has been spent and the effectiveness of the resulting advertising?

9. I'd like some more information about the OMHA's role in the market and any dealings that the program has had with it?

   a. Do you have a contact at OMHA or with any specific Oregon-based manufacturers? If so, can you provide that information to me?

10. Can you send me the contact list for retailers that have participated in the program?

11. In the kick-off meeting, we were told that the program contacts builders primarily through BOSs. Are BOSs also involved in contact with manufactured homes manufacturers and distributors?

    a. If so, is that just in the recruitment stage or do BOSs have continuing contact with manufacturers and retailers after program recruitment?

D INTERVIEW GUIDE FOR BOSs AND FIELD REPRESENTATIVES

Name _____

Company _____

Title _____

Date _____

Interviewer _____

1. What is your role in the Energy Trust Efficient New Homes program?

   a. [If not answered already] What specifically is your role in contacting builders on behalf of the program?

2. Can you explain your understanding of how the program operates? (For both site-built and manufactured homes, as appropriate)

3. Can you describe your communication about the program with Energy Trust, PECI, and or its subcontractor, CSG?

   a. Probe: what do you communicate about and how often?

   b. Have there been any communication issues?

      If so,

      What has been done to deal with them?

4. From your perspective, how has the program been going so far since the code change? (Site-built and manufactured, as appropriate)

   a. Any other challenges so far?

      If so,

      Do you know what is being done to deal with them?

5. What have you heard from builders about their reasons for participating in the program?

   a. Anything else?

b. What about manufacturers or retailers?

6. My understanding is that most of the builders that have participated so far this year have done only one or two houses with the program – is that accurate from your experience?

   a. Why do you think that is the case?

   b. What do you think could be done to get more large builders involved in the program?

[If PMC staff indicate that BOSs are NOT involved in builder/manufacturer/retailer contact after program recruitment, skip to Q10]

7. When we talked to Energy Trust and PECI, we talked a little about what the builders are doing. I'm wondering if I can get some more detail about that from you:

   a. We learned that several builders are using 2009 ENERGY STAR BOPS and going above ENERGY STAR. By how much?

   b. Are inside ducts popular?

   c. What other measures appear to be popular?

   d. Have you learned anything else notable about what builders are doing?

8. What, if anything, have you heard from builders about the program's incentive structure?

   a. What about from manufacturers/retailers?

9. What, if anything, have you heard from manufacturers/retailers about their participation in the program's coop advertising assistance?

   a. Are they satisfied with the assistance?

   b. Do they believe that it helps them sell homes?

10. Other than the economy, what do you think are the potential barriers to program success?

    a. What can be done to overcome them?

E INTERVIEW GUIDE FOR BUILDERS

Name _____

Company _____

Title _____

Date _____

Interviewer _____

[Before contacting builder, identify the following information:

BOP path(s), if any, that builder followed:

Envelope Upgrade Tankless WH Inside Ducts

Did the builder exceed ENERGY STAR with a home? Y N]

Hello, my name is _____. Energy Trust of Oregon has hired my company to evaluate its New Homes program. We're talking to builders like you that have received program incentives to get feedback on your experiences with the program. The information you give me will be completely confidential and will help Energy Trust improve its services to Oregon ratepayers. Do you have some time now or can we schedule another time in the next couple of days?

Builder Characteristics

1. About how many homes have you built in 2009? [Total homes]

2. Did you build any that did not include energy efficiency measures that would have qualified them for the program?

   If yes:

   a. How many?

   b. Why did you not include measures that would have qualified them?

3. How has your business changed as a result of the economic downturn?

   a. Have you changed focus?

4. On a typical project, how important is the home's energy efficiency among all the factors you consider?

   a. How important is energy efficiency to the homebuyer?

5. How long have you known about the incentives and assistance that Energy Trust provides for new homes?

6. Are you a member of an HBA? [Homebuilders Association]

   a. If so, which one?

7. Do you participate in the Green Building Council?

Program Knowledge and Participation

8. How did you learn about the Energy Trust New Homes program? [Probe: BOS (name), web, ads, referral, other]

9. Did you seek out the program or did someone from the program seek you out?

10. Who did you first speak to about participating in the program? [Probe: BOS (name), program staff, other]

11. Why did you decide to participate in the Energy Trust New Homes program?

12. Have you attended any Energy Trust sponsored trainings since the beginning of 2009?

    If so:

    a. What trainings did you attend?

    b. Overall, how valuable were they?

    c. Which trainings, or which aspects of trainings, were most valuable?

    d. Which were least valuable and why?

    e. What would you suggest to improve trainings?

13. Have you sought any other training or other kinds of professional development?

14. Do you also participate in other new construction programs (ENERGY STAR, LEED, Earth Advantage)?

    a. If so, what advantages do they bring you?

BOSs

I'd like to know a little bit about your interaction with Builder Outreach Specialists or BOSs.

[If participant is not familiar with BOS, explain: these are individuals that Energy Trust hired to interact with builders on the program's behalf. They may also be affiliated with Earth Advantage Institute.]

15. How frequently do you communicate with a BOS?

16. Do you feel that the BOSs are helpful? Why or why not?

17. Do you feel that BOSs effectively promote Energy Trust's program?

18. Is there anything you would like to change about the way BOSs interact with you or is there any way that they could reach out to builders more effectively?

EPS

19. Are you familiar with the Energy Performance Score (EPS)?

20. Have you built a home that received an EPS?

    [If not, skip to Q18]

    If so:

    a. Have you used EPS as a marketing tool?

       If so, how?

            How valuable did you find EPS in your marketing?

            Does EPS help you sell a home?

            If so, how?

                a. How important is EPS in selling a home, compared to other factors?

b. What types of information on the EPS score sheet are homebuyers most interested in?

c. Is there any information on the EPS score sheet that homebuyers find difficult to understand?

d. What would make EPS more effective as a marketing tool?

21. Was a house that you built selected by the program to be included in a home tour?

a. Did having an EPS help you market or sell the home that was included in the tour?

b. Do you have any suggestions on how to improve assistance with home tours?

22. Do you find the EPS a valuable tool in deciding whether or not to include energy efficiency measures in a home or in deciding what measures to include?

a. Why or why not?

b. What would make the EPS more useful in deciding whether or not to include energy efficiency measures in a home or in deciding what measures to include?

23. Has knowing the EPS of homes you've built made you want to build more energy efficient homes?

Measures

[If the builder achieved ENERGY STAR:]

24. My records show that you built (an) ENERGY STAR home(s):

a. Why did you decide to try to achieve ENERGY STAR rather than do a lower level of efficiency?

b. Why did you decide to use the specific BOP path(s) that you used? [Envelope Upgrade, Tankless WH, or Inside Ducts]

[If the builder followed the envelope path:]

Had you considered any of the other BOP paths?

25. Why did you decide to follow the Envelope path rather than the other path(s) you considered?

    a. Do you have plans to follow either of the other BOP paths in homes that you build in the future?

       If yes, which path do you plan to follow and why do you plan to follow that path?

       If no, would you consider following a different BOP path in the future?

       If so, under what conditions would you follow a different path? If not, why not?

[If the builder exceeded ENERGY STAR:]

26. My records showed that you built (a) home(s) that exceed ENERGY STAR minimum requirements:

    a. Was it your intention to exceed ENERGY STAR?

    b. If so, why did you decide to go beyond ENERGY STAR?

27. What types of energy efficiency measures are you using most?

28. What kinds of barriers prevent you from taking on more energy efficiency measures in the homes that you build?

    a. Does the program address those barriers effectively?

Program Processes and Calculators

29. Did you have any problems understanding or completing the program's application?

    a. If so, what were they?

30. Did you seek any help with the application process?

    If so:

    a. From whom?

    b. Was the help you received adequate to address the issue? If not, why not?

31. Over all, how would you describe the communication with the program staff and/or BOSs?

a. Were there communication challenges or roadblocks?

b. If so, what were they?

32. Did the inspections/verifications that the program requires create any challenges for you?

a. If so, what were they?

33. Do you feel that you received the incentive in an appropriate amount of time?

34. Is there anything we haven't already covered that would help the program improve its participation process?

F INTERVIEW GUIDE FOR HOME MANUFACTURER RETAILERS

Name _____

Company _____

Title _____

Date _____

Interviewer _____

Retailer Characteristics

1. How many manufactured homes does your company typically sell in a year?
   a. How many of those are in Oregon?

2. What areas do you serve in Oregon? [Get as detailed a description as possible; list of counties if possible]
   a. Do you have an estimate for the size of the manufactured home market in those areas? (e.g., the number of homes sold per year)
   b. What share of the manufactured home market would you say your company has?
   c. Do you have an estimate of the size of the total manufactured home market in Oregon?
   d. What would you estimate is your share of Oregon's manufactured home market?

3. Of the manufactured homes you sell in Oregon, can you estimate what proportion of those have any energy efficiency features – that is features that raise the energy efficiency to above code?
   a. What proportion are ENERGY STAR?
   b. NEEM?
   c. Eco-rated?

4. Do you have an estimate as to what proportion of all manufactured homes sold in Oregon – by your company as well as others – are ENERGY STAR qualified?

5. Do you see any changes occurring in the proportion of energy efficient homes you sell?

6. Has the economic downturn affected your business and, if so, how?

   a. Has there been any change in what customers demand?

   b. Have you changed your marketing or the services you offer to customers?

   c. If so, in what way have you changed?

Customers

7. How concerned are your customers with a home's energy efficiency?

   [Clarification] How important is it in their decision to buy a house?

8. About what proportion of your customers specifically ask for energy efficiency features?

9. When discussing energy efficiency, how often have your customers asked about what affect it would have on their utility costs?

10. Have you noticed any changes in customer concern for energy efficiency in the past two years or so?

11. Are there any energy efficient features that customers are particularly interested in?

12. If a customer does not specifically ask for energy efficiency, do you generally attempt to sell them on it?

    a. If so, about how often (in what proportion of cases) are you successful in up-selling energy efficiency?

13. Are customers generally aware of the Energy Trust Efficient Manufactured Homes program when they first come to you?

    a. If not, do you tell them about it?

14. How about specifically those customers who buy a home that qualifies for an incentive under the program—do they generally come to you knowing about the program?

Interaction with the Program

15. What kinds of assistance and/or training have you received from the program?

16. Is there any kind of assistance or training that the program doesn't provide that you think would be helpful?

17. Have you received coop advertising assistance?

    a. Was that service valuable to you? Why or why not?

       [Clarification] Do you believe it helped you sell more energy-efficient homes?

18. Have you received any model home incentives?

    a. Did you find that valuable? Why or why not?

       [Clarification] Do you believe it helped you sell more energy-efficient homes?

19. What program elements have you found most valuable?

    Model home incentives ($400 per house for 2 houses a year)

    Coop marketing (program pays 50% of ad costs up to $2500 per year)

    Sales incentives ($500 per Energy Star Home, $350 for gas territory only homes – incentive structure to change in 2010)

20. What have you found least valuable?

21. Please tell me about your experience working with Energy Trust and the organizations that administer the program (PECI office staff, APT ENERGY STAR Field staff). Do you feel that your communication with program staff has been effective? Why or why not?

    a. Do you feel that program and field staff are accessible if you have a problem or a question?

    b. Do you feel that program and field staff are responsive to your needs?

c. Have program and field staff been able to effectively resolve any issues you've had or answer your questions?

22. In your experience, are program and field staff knowledgeable about the manufactured homes industry?

23. How could program and field staff better serve manufactured home retailers and manufacturers?

24. What kinds of barriers prevent you from selling more energy efficient homes?

a. Does the program address those barriers?

b. How could the program address the barriers more effectively?

Program Processes

25. Did you have any problems understanding or completing the program's application?

a. If so, what were they?

26. Did you seek any help with the application process?

a. If so, from whom?

b. Was the help you received adequate to address the issue? If not, why not?

27. Did your incentive payment come on time?

a. If not, what held it up?

28. In your view, are the incentives provided appropriate?

a. If not, why not?

b. Would a tiered incentive structure that provides more money for more efficient homes help you sell more homes with greater energy efficiency?

29. We understand that some retailers allow the sales incentive to go directly to the sales staff, while other retailers do not. Can you tell me how your company deals with the incentive and with rewarding salespeople to sell an energy efficient home?

For Manufacturers (Palm Harbor, Fuqua)

30. At present, the program provides incentives only to retailers, not manufacturers. Would there be any value in changing this to provide incentives to manufacturers?

31. Why or why not?

Closing

32. Do you have any other comments or suggestions you'd like to add to the above?

33. That's all my questions. Thank you very much for your time.