PROCESS AND IMPACT EVALUATION OF THE 2007-2008 ENERGY TRUST OF OREGON HOME ENERGY SOLUTIONS PROGRAM

Volume 2

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January 2010

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1. INTRODUCTION TO VOLUME 2

This volume of the report provides detailed chapters for each of Energy Trust of Oregon's major Home Energy Solutions program components, which include single family rebates, Home Performance with Energy Star, Home Energy Review, multi-family homes, manufactured homes, and Energy Saver Kits, as well as a chapter presenting our findings from depth interviews with trade allies. This volume was designed for interested parties to review detailed findings from a specific program component that contributed to the key findings and recommendations presented in Volume 1. Appendices include the previously submitted early feedback memo and engineering analysis, as well as a market assessment memo of the five key markets.

2. TRADE ALLIES

This brief discusses findings from 28 interviews with Energy Trust trade allies conducted by Opinion Dynamics in July and August 2009.

Our interviews focused on specific aspects of each trade including 6 interviews regarding insulation, 5 on windows, 5 on gas furnaces, 5 on heat pumps, 4 on duct work, and 3 on Home Performance with ENERGY STAR. However, some trade allies work in other trades in addition to the specific ones for which we interviewed them, and sometimes they provided comments about those other trades. The trade allies interviewed are geographically dispersed around the Portland metro area; 17 of the trade allies are from Portland or a suburb, 8 are slightly farther out from Portland or located south throughout the state along I5, 1 was from the northern Coast, and 2 were in Bend.

All interviewed gas furnace contractors had been trade allies for more than 5 years. In 2008 they installed from three to over 200 gas furnaces. One of these contractors does very little work in Oregon as he is based in Vancouver, Washington. The heat pump contractors interviewed have been trade allies from 2 years to the beginning of the program and in 2008 installed three to 30 plus heat pumps. The duct sealing contractors have been trade allies ranging from one year to the time Energy Trust "came into formation." In 2008 they performed from four to over 700 duct related jobs as an Energy Trust trade ally. Please note that one contractor no longer does duct work through Energy Trust because he does not meet new certification requirements (but he does still do insulation). The insulation trade allies have been trade allies since Energy Trust started, but one mentioned only a year and a half. In 2008, they performed anywhere from 15 to over 300 insulation projects for Energy Trust of Oregon. The windows contractors have been trade allies from two to nine years. In 2008 they completed from two to over 10 window jobs with Energy Trust.

Program Satisfaction

Overall, trade allies are quite satisfied with the program. While the nature of our discussions was more qualitative, we asked one quantitative question regarding program satisfaction. Similar to Energy Trust's findings from their 2009 Trade Ally Survey, we found that overall satisfaction was high. Most program allies (69%) rated the program at least a 4 on a scale from 1 to 5, where 1 is very dissatisfied and 5 is very satisfied. Those who were satisfied often mentioned that Energy Trust was easy to work with, that people on the phone were friendly, and that the application process was easy.

In general, trade allies see many benefits to their participation with Energy Trust, in particular interviewees cited access to job leads and the customer confidence that being associated with Energy Trust provides as key benefits. The key benefits mentioned include:

- Job leads and access to referrals
- Independent verification/ legitimacy/customer confidence
- The name/name recognition
- Cash incentives
- Helping customers save money and energy

- Helping the environment/expanding the green market/efficiency
- Support /training/seminars
- Staying in touch with market/keeping informed
- Marketing reimbursements

However, some people disagreed with these assertions; specifics are discussed below. In addition, some trade allies also mentioned some negative overall perceptions of the program, especially related to a perceived political or bureaucratic nature, including a lack of flexibility.

Program Components

We have focused this write-up on several areas where trade allies communicated problems or expressed suggestions for improving the program. These areas include: (1) communication, (2) requirements and policy changes, (3) marketing, (4) paperwork and process, (5) tax credits, (6) financing, (7) roundtable, (8) website, and (9) real estate trade ally network. Some of the topics were specific questions in the interview, but others were brought up by the trade allies of their own accord. The primary link among these areas seems to be the need for better communication between Energy Trust and the trade allies. Specific recommendations follow each section.

Communication

Despite the fact that when asked about their satisfaction with the program many trade allies discussed the helpfulness of Energy Trust representatives on the phone, many others also mentioned difficulties with communication:

> *Well I think…basically some of the telephone conversations we have…just were not what I would consider real customer service oriented.*

Some also indicated that contractors had to be proactive to receive program information:

> *I think for the most part - the most important thing is for them to provide us the information and then make sure we've got the updated… I think the contractor has to take some of the responsibility as well to make sure they're staying informed…*
>
> *I've never even talked to anybody…*

And others indicated difficulty finding appropriate people in the organization to talk to, especially higher up:

> *It's a very complex organization from my point of view, and … I have trouble finding the answers to some of my questions.*

Trade allies report being contacted through a number of ways, primarily email and mail. However some also mentioned the newsletter, the website, and personal contact. Trade allies overwhelmingly prefer to be contacted through email. However, a few did mention that

they prefer phone, mail, newsletter, or personal contact. On the other hand, two mentioned that they probably will not see new updates or information if it is only in the newsletter. Program implementers should review if it would be possible to make email the default form of communication while allowing contractors to select another preferred option as necessary. One contractor also had this caution:

> *…I think one of the suggestions I would make for [Energy Trust] is to make sure that they are working directly with the person who's responsible for managing those programs… They don't really have anybody specifically going back around and double-checking with the people saying are we working with the right person? Are we giving the information to the right person at the right times?*

Several trade allies also mentioned that they felt overwhelmed at times with the information they received and suggested that when something was really important, that they somehow distinguish it from all of the other mail that is sent out.

In addition, many contractors were not aware of other program offerings like marketing or coop advertising availability, new guidelines, and email forms. It is not clear if this information has been communicated to trade allies and they are glossing over it, or if it has not been communicated to them at all.

Recommendations based on trade ally comments:

- Ensure that trade allies are getting the assistance they are looking for, whether over the phone or in person, or clearly explain to them if such assistance is not available
- Ease access to higher level managers in the organization, especially when a decision needs to be made
- Track communication preferences - primarily contact trade allies through email but allow them to opt into a different communication preference
- Ensure that the most important information disseminated stands out from the rest – consider two-day, marked or priority mail for key pieces of information

Requirements and Policy Changes

The trade allies reported that their status as a trade ally should set them apart from other contractors. For this reason, many allies felt that there should be requirements that weed out inadequate contractors. However, many felt that the current minimum requirement of five projects should not be raised because that would weed out smaller shops. Some larger companies were in favor of raising the minimum requirements.

The trade allies overwhelmingly felt that requirements should be more stringent. They frequently mentioned certification:

> *I think there should be a level of qualification… a little bit more stringent to ensure that not just anybody can go through a quick class and get certified. I think there needs to be some sort of certification that the installers will go*

> *through or the company… to make sure that the knowledge is there and that they've all been trained…*

Some of the contractors mentioned specific certifications such as NATE or journeyman level. Other requirements included a minimum number of technicians and 24/7 service. Others recommended continuing education to keep up on certification. Inspections were mentioned several times to remove low performance dealers. A few suggested exams for contractors, although one added the following caveat:

> *You know, as an insulation contractor, you have seasonal volume, so you bring people on and then you have to lay them off, and you can't afford a very extensive training program for people that are only going to be there for a few months…So we feel like we can take one person who is highly trained and match them up with a person who is less well trained and get a satisfactory result… I don't think every single employee on the job has to pass the entire test, but the job supers or the crew chiefs should have to be able to do that.*

When asked about drawbacks to participating, some trade allies mentioned their perceptions of trade ally requirements. Three noted that the insurance costs are high as a result of the program requirements. One trade ally also expressed concern with "the constant need to get recertified," the required phone conferences, the need to keep track of the number of jobs each person within a company has done per year, the two year warrantee (longer than the state's), and the quality control which "just gets a little silly" at times, such as saying a screen should have been inserted. Another mentioned the "number of hoops that we have to jump through in order to keep working with the Energy Trust." These concerns were not mentioned by any other allies.[1]

A few trade allies also mentioned concern about the perceived large variation between rules and requirements for different programs within HES:[2]

> *Well there are drawbacks. I think the thing that bothers me the most is that when [Energy Trust] write[s] the rules,…the rules get more and more complicated and you have three or four different programs, each with a unique set of rules, it gets harder and harder to… keep everything straight and essentially to keep the information communicated correctly to your employees…*

The trade allies expressed a desire to be involved in the process of making policy changes. In fact, a few brought this up when discussing their satisfaction with the program:

> *…We are always made aware or told about the unleashing of a new program and if we want to apply to be part of this new program to apply, but the program is already in final stages of development. We need to be brought in*

[1] Energy Trust staff suggested that at trade ally meetings they could have allies mention their issues and at another meeting ask other allies how they addressed the problem.

[2] Energy Trust staff suggested having programs discuss their rules and streamline them.

> *at the very beginning to help shape these programs that will continue the long term sustainable prospects of our industry.*

Overall, the trade allies reported a wide range of time periods required to comment on proposed policy changes; but agreed that two weeks would be sufficient. Once changes have been decided upon, the trade allies require 90 days before changes go into effect. The trade allies' primary concern about changes going into effect was that the timing would not to affect the contracts already written.[3]

A few trade allies also commented that they thought the existing process worked well, although one noted a suggestion for refining it:

> *I would've liked to have seen them have maybe more of an organized choice making, decision making process. The Energy Trust sort of was throwing ideas out there and then the public meetings they would sort of discuss them and then at the next public meeting, they would sort of revise and discuss, and instead of doing that, I'd like to see them come up with a couple of different options for their incentive structures, discuss the benefits and the drawbacks, you know, the merits, and then sort of vote on them, maybe make some amendments based on what they see as benefits and then discuss them again of course in a public forum before picking…*[4]

A few contractors expressed concerns that the input should be gathered from other parts of the state besides Portland.

Some contractors mentioned problems meeting dynamics, such as meetings being dominated by a few people, as well as that for some of the meetings allies not given adequate notice.

Recommendations based on trade ally comments:

- Make trade ally requirements a standard for the industry, primarily by requiring appropriate certification
- Do not change the minimum of five projects
- Keep ongoing trade ally requirements as streamlined as possible and as consistent as possible between programs
- Involve trade allies in policy changes from an early point in the process and poll them on proposed changes
- Provide two weeks for comment and at least 90 days before changes go into effect
- Communicate policy changes primarily through email, mail, or roundtables
- Ensure that input is gathered from beyond Portland

[3] Note that Energy Trust generally provides grandfather clauses.

[4] Energy Trust staff noted that the decision process and timeline should be more concrete and transparent.

Marketing Materials/Support

A large number of trade allies were unfamiliar with the cooperative advertising program, and few said they had participated in it.[5] Those that were familiar mentioned phone book ads, internet ads, television and radio ads, and trade shows. A few participants spoke very highly of the cooperative advertising program.

Only about half of those that utilize the cooperative advertising program were aware of the new guidelines. Those allies seemed to be satisfied with them. One trade ally commented on how he had been affected by them:

> *[The new guidelines] did lessen my co-op dollar amount. Going forward I think it will be a benefit because it's going to push us to get more jobs so that way we can bet all the co-op dollars possible…*

Those who haven't participated mentioned that they had looked into it, their ad agency did not seem interested, they did not do enough business, or they were satisfied with their current volume. Some of the interviewees also were not familiar with the marketing and advertising component of the business.

As far as marketing support, one trade ally mentioned, "All I have to do is call and ask for it," and many other trade allies felt they were receiving support. However, approximately one-third of the trade allies we interviewed either felt they were not really receiving support or were not even aware that this was an option. In addition to this apparent lack of awareness, a few problems were mentioned:

> *I'm not getting any marketing support from them…The few times I've talked to the marketing people they imply that it's really easy but then when you actually try and go through the process it ends up being more hassle than it's worth so we end up in most cases not doing anything…*

> *Actually I'm not aware that any exist anymore. Every time we've requested - they keep saying they're going to have all these brochures and stuff…. under the old program there was a pretty nice one, there was a three or four page fold out that was comprehensive, [but] as far as I know they…don't exist anymore…And I've gotten tired of asking about it.*[6]

A few trade allies mentioned that they do not use Energy Trust marketing or promotional materials because just being on the list is enough. However, many trade allies mentioned some specific pieces of literature that they like:

[5] Consider finding out from marketing what percent of trade allies have actually used cooperative advertising.

[6] Energy Trust staff suggested having brochures on the trade ally web page and possibly an online ordering form.

> *You know, they've got some really nice tri-folds out that works. They've got some things on their website that you can download to educate the homeowner that works.*
>
> *That flyer works really good because it explains all the benefits and it explains what… other things they can do to make their house more efficient.*
>
> *Actually my most favorite thing to use is what I find online, just even printing like the information that's on the website, and then that just seems the easiest to use. It has the most updated information.*

The trade allies also had a variety of requests for materials and programs. Some mentioned specific materials for their industry or other specific promotional materials:

> *If they had some kind of a flier for windows that would include what other incentives would be to be included for rebates that would be good.*
>
> *Yeah I would say … a handout that was specific to you know if you have an insulation contractor or a window contractor.*
>
> *Air and duct sealing flyers more specifics.*

Some trade allies also mentioned mailings and advertisements from and about Energy Trust:

> *Well I think they need to make the public more aware of their presence and the availability of the Energy Trust rebates.*
>
> *I think more ad campaigns stating who they are and what they do.*
>
> *…maybe some kind of mailing, block mailing, like older subdivisions, older areas of town…*

Another also expressed the desire for more proactive help. This dovetails with the fact that many trade allies were not aware of all the information available and did not always seem to know that they could receive marketing support.

Recommendations based on trade ally comments:

- Make sure, if funding is available, that trade allies are aware of the cooperative advertising program and the new guidelines
- Proactively make trade allies aware of the range of marketing materials and marketing support available, and particularly access to online materials
- Create marketing materials for the customers for specific measures such as insulation or windows
- Consider increasing positive advertising of Energy Trust and Energy Trust programs

Paperwork and Process

Most trade allies either completely fill out forms for their customers or at least provide support as they need it.[7]

Many of the trade allies said that the forms were pretty simple and straightforward. Some commented on the benefits of the new form:

> *I think the new form that just came out probably works the best. It has the square footage on it and all that stuff already. Some of our systems, well our system in particular, doesn't have, you know, how many square feet or anything like that. It's just a pretty basic - this is what you use; this is how much it costs; and we're done.*

One trade ally suggested that a follow-up process that would help:

> *The only way that I would suggest is to again, allow us to email them in to a direct contact and have somebody to follow-up with to work with the client to say where in the process are they because as it is right now …the follow-up could be better …. If we could email and have a direct contact to know the person that's assigned to that particular consumer and then follow-up a week later and say ok where are we at in the process? Is this job going to be inspected and how long until the consumer can expect a check because as it is right now we quote six to eight weeks.*[8]

And finally, one trade ally suggested than an online submittal would help. This is consistent with the fact that many of the trade allies were not aware of the email form availability. Of those that had actually used the email form, most said it helped the process. However, one trade ally mentioned that it was a slower process because they have to send a separate email for each application (rather than just putting a pile in the fax machine), and another trade ally said they have yet to find an email address to send in the form.

In addition, a few trade allies mentioned the process of submitting the paperwork as a drawback to the program, particularly a long lag time between bid and rebate, multiple phone calls to resolve problems, and phone calls required to fix paperwork errors when missing data is often available in another location in the paperwork.

Recommendations based on trade ally comments:

- Trade allies need to be made aware of the online submission process
- Ensure trade allies are aware of the universal forms and whether there is an option to still use individual forms for certain measures

[7] Energy Trust staff suggested that if this is true, the forms should be electronic so that it is easier for trade allies to fill out or submit.

[8] This suggestion could be addressed more cost effectively by having automatic replies to electronic forms that note that the form was received and average processing takes X days.

- Ensure appropriate Energy Trust email addresses are clearly available
- Consider a general follow-up process (for applications without problems) and improve the follow-ups for applications with problems so as not to alienate customers or trade allies

Tax Credits

The trade allies are aware of the federal and state tax credits with very few exceptions. They also promote these on basically every job that is eligible, and most trade allies help with the forms, especially if requested by the customer, although a few just send them customers to websites.

A few trade allies also did mention that Energy Trust will help customers with the Oregon tax credit process. They also had several suggestions for other ways Energy Trust could help. Two suggested making all three into one form,[9] two suggested that Energy Trust could put it in their advertising, and two suggested mailings. Several trade allies also suggested a variety of informational materials including "easy to understand instructions for how to qualify" and "a simple flyer…just to say this is what's out there."

Some of the trade allies also thought classes that outlined the requirements would be useful.

Also one suggestion indicated confusion between Energy Trust incentives and Oregon tax credits:

> *Well, … it would be nice to have a little bit of a feedback mechanism from them because really … what you do to apply for tax credits is check a box on the forms that we normally … fill out. It's only one box and it always seems a little bit dangerous to me, like, you know, a good portion of this homeowner's money is tied up in somebody making sure that they read the box right and submit the form appropriately, and I wish that we as the applying company, could have sort of a confirmation… that this has been received. It will be applied for an energy tax credit.*

The trade allies did not believe that the multiple rebate and tax credit opportunities caused any problems, and in fact felt they helped sell products.[10]

Many of the trade allies felt that the tax credits were of the same importance as the Energy Trust incentives, "again because the customer is getting money back, that's what they see." Many of the trade allies also expressed that currently the federal tax credit is the most important:

[9] Although the forms cannot be combined, they can be aligned and streamlined as much as possible.

[10] Energy Trust staff noted that it would be good to identify which specific products qualify for which rebates and incentives, e.g. .30 windows or better.

> *Basically because there is no pre-qualification and there's no secondary measure required so it's a lot simpler and that's probably the biggest thing, simplicity is what most customers are looking for.*

The trade allies did not speak as warmly of the Oregon tax credits, and some thought the Energy Trust incentive was the best. Only one ally mentioned that none of them were very important.

Recommendations based on trade ally comments:

- Consider providing marketing materials (possibly already addressed with the new incentive grid) or trainings to help trade allies put together a package of Energy Trust incentives and federal and state tax credits
- Consider leveraging the current importance of the federal tax credit to promote energy efficiency by including it in advertising or other materials

Financing

More often than not, trade allies suggest some type of financing to their customers. In addition, most were familiar with Green Street Lending, and of those, most discussed it with their customers. One contractor said financing "gives the homeowner another avenue to finance the program instead of having to come up with all the cash." However, contractors expressed concern about financing options, especially in today's economy.

One contractor mentioned attractive aspects of Green Street:

> *Well the interest rate is very attractive. Also, the lack of heavy origination fees, where some of the other products in the last six months have come up with some really nasty origination fees*[11]*.*

However, other contractors expressed problems with the timeline, and approval process. The contractors who do not offer financing noted that most customers already have their financing in place, or that the type of work they do, like weatherization, does not cost that much.

Recommendations based on trade ally comments:

- In this economy, where it is hard to get credit, Green Street may be able to fill a gap
- Make sure all trade allies are aware of Green Street, especially contractors that deal with bigger ticket items
- Investigate ways to make Green Street Lending faster and easier to work with

Roundtables

Most of the trade allies or someone else in their company had been to at least one roundtable meeting. Only one mentioned that they go quarterly; most seem to attend one to two a year or every couple years. One said he thought that a previous salesman participated

[11] Energy Trust staff noted that this could appear in the messaging to contractors, if it does not already.

in about six over the phone, but another recommended webinars.[12] A couple trade allies also said the roundtables are too far away to travel.

The trade allies for the most part seemed to think the roundtables were good and interactive. However, a few also mentioned that they only like to go when the roundtable pertains to their specific industry. One mentioned that he liked the breakout sessions because it involves the specific trades. However, another trade ally said he generally did not have time for breakout sessions. In addition, although some trade allies were interested in additional training, some thought it might be too much to add on to a roundtable. Most also did not have suggestions for topics, although one mentioned "new stuff that comes out," and another suggested business aspects and field training:

> *Sales and marketing efforts…and … running your business. … I don't think they're in that end of it so much, … but … they can always help train the field people, installers, technicians, you know so that would be great.*

Recommendations based on trade ally comments:

- Provide options for phone or web roundtables to provide access to those not in Portland, but make sure these people have the opportunity to interact as well
- Consider focusing roundtables on specific trades or pilot testing this format; another option would be mini roundtables for each group back-to-back
- Additional training is valuable but maybe not in association with roundtables

Website[13]

Virtually all of the trade allies use the website, from once in a while to everyday. The trade allies for the most part said it was straightforward and easy to navigate:

> *I think it's pretty good, and the forms that I take off the website are easy to download … [it allows] the customer and the trade ally to have a common message.*

A few mentioned their experience with the new website:

> *…in our last roundtable meeting I met with the website designer and I got to view the new website and we're pretty happy with that… I haven't got to work on it myself to navigate…it and see how easy it is but I like the ideas that they're promoting…*

Almost all of the trade allies send their customers to the website. About half of the trade allies who talked about the website said they search the online directory for other contractors to network with:

[12] This may demonstrate confusion, as roundtables generally do not have a phone in option.

[13] Energy Trust's revised website was launched on September 15, 2009, after the trade allies were interviewed.

That's where I currently have been finding the guys to do the blower door test and the air sealing, something that we're not certified for.

Recommendations based on trade ally comments:

- Make sure the new website addresses navigability issues
- Make sure contractors who are used to the old website are able to easily transition to the new one
- Consider usability groups with a few contractors prior to rolling out the website to ensure that it meets their needs

Real Estate Trade Ally Network

Only three trade allies said they were familiar with the real estate professional trade ally network, and none of them had actually communicated with one. However, two did mention that they saw value in it.

Recommendations based on trade ally comments:

- Better promote the real estate trade ally network, especially among trade allies that work in industries that increase the value of a home

3. SINGLE-FAMILY REBATES

3.1.1 Single Family Homes In-Brief

This brief is based on a review of the program database, materials and 655 interviews with HES and HP participants. Information specific to HP participants is presented in a separate brief.

Overall, 19,731 people participated in the single family homes Home Energy Solutions program in 2007 and 2008, not including Home Energy Review participants. These participants account for 16% of the gross kWh and 77% of the gross therm savings from the overall portfolio.

Satisfaction with the program appears to have declined since 2006. The greatest needs that, if met, could increase satisfaction with the Home Energy Solutions program appear to be a streamlined application process and more advertisement and quality control of contractors. In addition, marketing of the program could be increased. Specifically, we recommend that:

- Rebate instructions should be made clear and paperwork streamlined as much as possible (if this has not been done already); Energy Trust could also encourage contractors to do the paperwork for their customers
- For overall program satisfaction, experience finding and working with contractors can make the difference between a rating of 8 (on a scale of 0 to 10) and 10; Energy Trust should strive to provide easy access to qualified contractors
- Energy Trust could leverage external tax credits for both awareness of their program and motivation for potential participants to take energy saving actions
- Energy Trust's list of contractors is more important for some measures than others, and could be made more prominent or advertised in locations where people search for contractors on an emergency basis
- Contractors frequently inform customers of the Home Energy Solutions (HES) program but seldom recommend additional energy saving measures; package solutions should be encouraged and incentivized at least among trade allies.

3.1.2 Single Family Homes Result in Large Percent of Program Therm Savings

The single family homes HES program accounts for 16% of the gross kWh and 77% of the gross therms from the overall portfolio. The numbers include those from the Home Performance with Energy Star program but not the Home Energy Review program. The large difference in percentages is mainly due to the fact that the multi-family program is focused heavily on electric measures and accounts for a large percentage of the kWh savings but very little gas savings. The single family measures include insulation, air sealing, duct sealing and insulation, gas furnace, heat pump, solar, and water heater. The net single family impact numbers are 1,460,931 kWh and 392,988 therms (derived from gross impact numbers of 2,408,628 kWh and 848,993 therms).

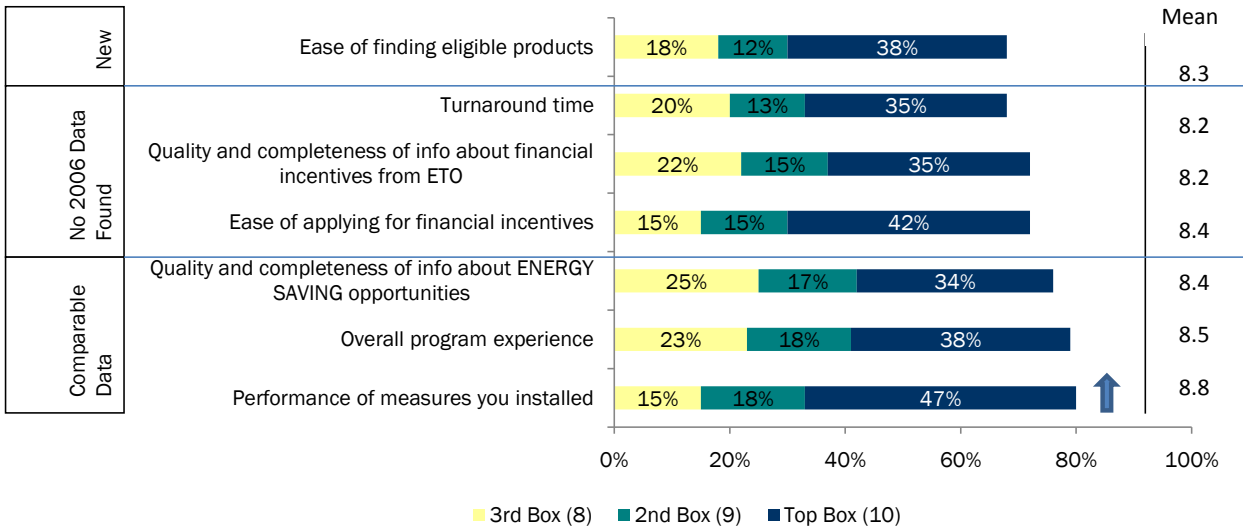
3.1.3 Satisfaction is Driven by Paperwork and, to a Lesser Extent, Contractors

We evaluated satisfaction of the Home Energy Solutions (HES) rebate program and Energy Trust in general in order to track changes in satisfaction found in the 2005-2006 process evaluation completed by ECONorthwest.[14] Overall satisfaction with Energy Trust appears to have declined significantly from 2006. In 2009, 55% gave the program a top two box rating (on a 0 to 10 scale) while in 2006 the comparable top box rating (on a 1 to 5 scale) was 67%. However, the 2009 top 3 box rating is 80%, and the mean is 8.5.

We also found that satisfaction with HES is not as high as it could be. However, satisfaction with the quality and completeness of information about energy saving opportunities and overall experience has remained stable since 2006 (Figure 1), and satisfaction with performance of measures installed has increased.

[14] It should be noted that the scales on these questions have changed. The 2006 survey used a 1 to 5 scale, while our survey used a 0 to 10 scale in order to remain consistent with the scales used to calculate free ridership and net-to-gross ratios. To adjust for this, we looked at trends between the Top Box rating in the 2006 survey and the Top 2 Box rating in our survey.

Figure 1. HES Satisfaction Top 2 Box (n=655)



Notes: An arrow indicates that the Top 2 Box rating is signficantly different at the 90% level from the Top Box rating in the 2005-2006 process evaluation.
Mean is the mean rating on a 0 to 10 point scale.

Paperwork

Our interviews asked respondents who were dissatisfied with Energy Trust in general, with applying for financial incentives, or with the overall HES program experience why they were dissatisfied. A large number of these respondents mentioned confusing, unclear, or difficult paperwork and processes. This included both completing the forms and submitting them to Energy Trust. It appears that low satisfaction scores related to HES are likely heavily related to the ease (or lack thereof) of the paperwork.

Energy Trust is currently exploring the use of an online application to facilitate the paperwork process. Of the 655 rebate participants, 65% said they would have completed the application online. Top reasons for not doing so (n=199) included not having a computer or internet (26%), preferring paper (19%), or having someone else such as the contractor or installer complete the forms (16%).

Recommendations

Based on the comments we received from participants, we recommend the following changes related to the paperwork itself and the paperwork process:

- **Provide clear, step-by-step instructions** on how to qualify for a rebate and fill out the paperwork. This may make the process less difficult and confusing for customers.
  - *"Have you ever tried to get insulation rebates? Try it."*
  - *"I was not clear about what information they needed."*
  - *"It was complicated trying to figure out what was eligible and what wasn't."*
  - *"I bought two different things I was under the impression I was going to get a rebate and it was not true."*
- **Streamline the paperwork** as much as possible (as suggested in the 2005-2006 process evaluation) to minimize error and eliminate the need for back and forth

between the participant and Energy Trust. (This may have already occurred with the universal application or the online trade ally application.)
  - *"The amount of times that I had to send in the paperwork to get them in order to get my $35 rebate was not satisfactory."*
- **Consider making incentives for contractors** to take care of the Energy Trust paperwork for their customers, as respondents who did not deal with paperwork seemed to give higher scores.
  - Responses from respondents who gave 10s overall:
    - *"The paperwork is handled by Energy Trust itself or the contractors so I hardly had any work to do."*
    - *"My contractor applied for the rebate…"*
  - Responses from respondents who gave 8s overall:
    - *"I was very pleased with the rebate but the whole system of getting the rebate was very complicated and it took a long time to get."*
    - *"I had to re-submit rebate paperwork multiple times."*
    - *"I rated it an 8 because they were very helpful during the process, but it took a few phone calls for us to get them to complete everything."*
- **Institute an online application but do not remove the paper application**, as this would alienate a large number (26%) of potential participants.

Contractor

Participant satisfaction with contractors is about the same as or higher than overall satisfaction with Energy Trust and the HES program. There is not a trend in satisfaction across the board from 2006 to 2009; some categories stayed the same, some increased, and one decreased.

Table 1. Contractor Satisfaction by Measure

	Insulation (n=170/ 172)	Duct (n=174/ 68)	Air (n=149)	Heat Pump (n=131/ 186)	Gas Furnace (n=124/ 125)	Windows (n=101/ 42)	Water Heater (n=117)	Solar Water Heater (n=58)
2009 Top 2 Box	↑63%	↓61%	58%	67%	56%	↑68%	68%	72%
2006 Top Box	52%	74%	NA	58%	55%	50%	NA	NA

However, when discussing the reasons for their overall ratings of Energy Trust, some participants mentioned issues with contractors. This indicates that contractor performance can reflect back on Energy Trust.

Recommendations

Although Energy Trust cannot take direct responsibility for contractors, there is an opportunity for Energy Trust to provide better verification of contractor ability (possibly

through more inspections), keep up-to-date lists of contractors, and make it easy to find contractors for specific measures. The quotes below give examples of how the contractor quality can make a difference in program satisfaction:

- Responses from respondents who gave 10s
  - *"The contractor did what he said he was going to do."*
  - *"I feel that the contractors did a great job and the program helped me a lot."*
- Responses from respondents who gave 8s:
  - *"I feel that they could have provided more specific information on specialized contractors to contact…"*
  - *"Most of my problems were with the contractor."*
  - *"The contractor did a bad job of sealing my home."*

3.1.4 Marketing Could be Ramped Up by Leveraging Tax Credits and Contractors

The majority of participants know this is an Energy Trust program. Of the 951 people who started the single family home participant survey, only 57 (6%) were not aware of Energy Trust of Oregon. It is likely that the contractors who installed the measures for these participants also handled the paperwork.

On the other hand, only 36% of the general population has heard of Energy Trust of Oregon, and 36% of those don't know what Energy Trust offers. Those who have heard of Energy Trust most often heard about it from a utility (23%), followed by word of mouth (20%) and mass media (15%).

The website is very important to Energy Trust participants and can feed a significant number of participants into the program; the vast majority of respondents were aware that information about Energy Trust is available online (78%), and most (55%) have visited the website.[15]

However, among participants who had visited the website, only 44% gave it a top 2 box score for helpfulness. The mean was 8.2. Those who did not find the website helpful reported that it was "hard to use," "not user friendly," and "more attractive than productive." Many respondents also reported unclear explanations and difficult navigability:

> *"I feel clearer explanations would have made it more useful,"*
>
> *"I think the website would have been more helpful if I could have found the information on the rebates more clearly and faster. I had to click millions of things to get to one thing,"* and
>
> *"I felt like you had to dig too far to get information."*

[15] These numbers might be high given that we screened out 57 people who were not aware that Energy Trust provided the rebates.

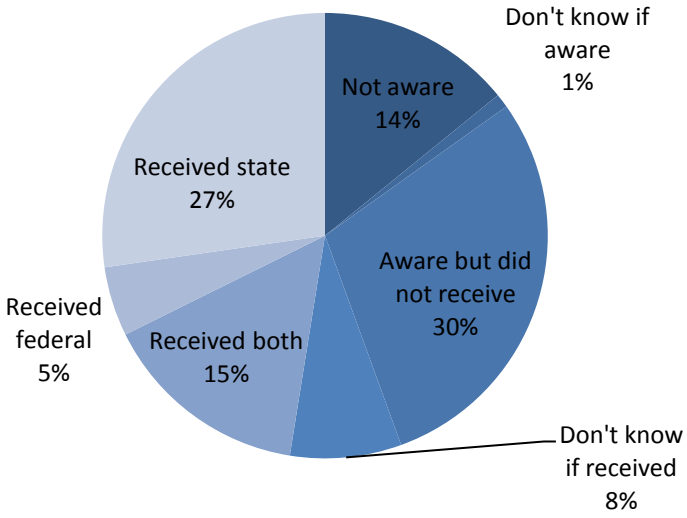
Recommendations

- Awareness of Energy Trust is high among participants but not among the general population; Energy Trust may want to consider altering or increasing their marketing methods
- The website is very important and should be made as user friendly, clear, and navigable as possible

External Tax Credits

The majority (85%) of Energy Trust rebate recipients is aware of other rebates, and 47% received either a federal or state tax credit or both (Figure 2). This awareness is higher for state tax credits (79%) than for federal tax credits (59%); the same is true for receiving them. However, the level of confusion between the rebates was very small and does not seem to be an overwhelming problem. Reasons for confusion included difficulty finding or identifying correct makes and models (cited by 9 respondents), confusing information (8), and problems with the contractor (8).

Figure 2. Tax Credits (n=655)



The most common products for which respondents received an Oregon tax credit (n=306) were furnaces (24%), clothes washers (17%), tankless water heaters (13%), heat pumps (12%), and solar water heaters (11%). The most common products for which respondents received a federal tax credit (n=153) were furnaces (20%), solar water heaters (18%), tankless water heaters (14%), insulation (10%), and windows (10%).

Recommendations

- Energy Trust should attempt to eliminate any existing confusion and increase awareness of other tax credits among their participants; this likely has been accomplished by the new incentive grid.

- Energy Trust should leverage these tax credits to increase the number of people adopting energy saving equipment by increasing affordability or decreasing payback time.

Contractors

The Energy Trust list of contractors is not important to most participants in selecting contractors for individual measures, particularly those that often require immediate replacement (Table 2). The list was most important to participants in the insulation program.

Table 2. Importance of the Energy Trust List

HP not included, (% Yes)

	Insulation (n=133)	Duct (n=119)	Air (n=85)	Heat Pump (n=129)	Gas Furnace (n=124)	Windows (n=92)	Water Heater (n=113)	Solar Water Heater (n=57)
Was the Energy Trust list important?	50%	39%	44%	28%	19%	34%	29%	39%

However, contractors can play a significant role in marketing Energy Trust programs and energy-saving measures. We find that heat pump and gas furnace contractors are most likely to feed participants into Energy Trust programs (Table 3). Importantly, duct sealing and air sealing contractors are more likely to recommend other energy-saving measures to their customers. However, at less than 50%, these numbers could be higher. In addition, numbers for other measures, such as water heaters, are exceptionally low.

Table 3. Relationship Between Energy Trust, Contractors, and Energy-Saving

SF only (not HP), % Yes

	Insulation (n=133)	Duct (n=119)	Air (n=85)	Heat Pump (n=129)	Gas Furnace (n=124)	Windows (n=92)	Water Heater (n=113)	Solar Water Heater (n=57)
Did your contractor inform you about Energy Trust programs?	72%	76%	73%	85%	89%	63%	69%	75%

Did your contractor recommend other energy-saving measures?	29%	40%	42%	26%	28%	29%	16%	35%

The number of contractors who informed participants of HES programs has increased across the board from the 2006 report in the comparable sectors of insulation, duct sealing, heat pumps, and gas furnaces (Table 4). However, the number of contractors recommending additional measures has remained stable since 2006 at low numbers.

Table 4. Contractor Comparisons: 2009 and 2006

	Insulation		Duct		Heat Pump		Gas Furnace		Windows	
	2009 (n=170)	2006 (n=172)	2009 (n=174)	2006 (n=68)	2009 (n=131)	2006 (n=186)	2009 (n=124)	2006 (n=125)	2009 (n=101)	2006 (n=42)
Did your contractor inform you about Energy Trust programs?	75%	69%	74%	62%	85%	NA^	89%	NA^	64%	NA^
Did your contractor recommend other energy-saving measures?	33%	33%	46%	48%	25%	23%	28%	25%	29%	26%

^Did not compare because 2006 questions were not asked of complete sample

Recommendations

- The Energy Trust list of contractors is more important for some measures than others, and could be made more prominent or advertised in locations where people search for contractors on an emergency basis
- Contractors frequently inform customers of the Home Energy Solutions (HES) program but seldom recommend additional energy saving measures; recommendations have not changed since 2006; package solutions should be encouraged and incentivized

4. HOME PERFORMANCE WITH ENERGY STAR

4.1.1 Home Performance In-Brief[16]

Between 2007 and 2008, 36 contractors completed Home Performance jobs at 340 sites, with an average of 6.1 measures per site. Of these, 5%, or 17 sites, did not have multiple measures installed. The most frequent measures installed as part of Home Performance jobs were duct work, air sealing, ceiling insulation, and floor insulation. These measures produce a moderate amount of energy savings per unit in comparison to the other measures rebated through the program.

Overall, both customers and contractors see value in HP because it relies on building science and a whole house approach to provide sound technical expertise of what to do in your home, and customers are very happy with this service. However, we recommend some changes Energy Trust could make to improve this component of the program. These changes may or may not end up being cost-effective:

- Work to distinguish Home Performance with ENERGY STAR from the free audit provided by the HES program (through marketing efforts)
    - Use the terms "building science", "technical expertise" and "whole house approach"---to set it apart from the free HER audit. This is what appears to be the valuable and distinguishing trait to customers and contractors alike.
    - Ensure that HER auditors, and non-HP trade allies if at all possible, are properly trained to be able to explain the difference between HER and HP to potential participants.

- Improve marketing of the HP program:
    - Leverage customer feedback and testimonials to promote the HP program to others; this may help overcome the potential barrier of cost. (Testimonials may also help to distinguish between HP and HER.)
    - Continue to employ multiple forms of advertising for HP, as participants come in from a variety of sources including internet, utility, mass media, and Energy Trust in general.[17]
    - Expand marketing of the HP program specifically to increase awareness levels at least to that of the HER program.

[16] This brief is based on a review of program databases, interviews with trade allies (3 Home Performance and 25 other), customers in the Home Performance program (70) as well as customers in the HES/HER program (730), and interviews with a sample of non-participating homeowners. Energy savings for the Home Performance program are included in the single family HES program and discussed in a separate brief.

[17] Additional research may be required for how to target specific income, age group, or other segments most likely to participate.

- Explore whether the Home Energy Analyzer can be used to further pull participants into the HP program.
- Expand HP information on the website to include more detail and specificity, not only of the comprehensive home assessment, but of the entire process for assessment, installation, and close-out.[18]

- Consider providing incentives for diagnostic testing or other HP-only incentives (perhaps if measures are installed following testing) in order to increase participation in HP and overall installation of energy efficient measures.
- Consider moving to different software besides Home Check, or allow a choice of software that provides the necessary information to the customer and the program.
- Consider extending the first year contractor incentives for number of jobs performed into the second year or moving some of the first year incentives into the second year to allow for a longer start-up time for the contractors.

4.1.2 Participants are Satisfied with HP, And More Satisfied with Energy Trust than HES or HER

HP participants appear incredibly satisfied with the service, as 89% would recommend it to a friend or neighbor. HP participants also report higher satisfaction with Energy Trust than do rebate only and HER participants (93% reporting an 8, 9, or 10 on a scale of 0 to 10 compared to 79% and 83%, respectively.) Only five HP participants rated Energy Trust a 7 or lower.

Value of HP is in Building Science, Generally Seen as Providing Technical Expertise

When describing the service as they would to a neighbor, participants often mentioned the value of the rebates, the energy and cost savings seen on bills, the improved comfort, and discovering leaks they knew nothing about. Participants seemed very pleased with the program, describing it as "fantastic," "helpful," "a very good way to determine how to save energy," and "friendly, prompt, and very informative." The following quotes summarize the program as a whole, and are representative of several others provided by homeowners who participated in HP:

> *A qualified individual gives you an assessment of the home and a list of what should be done to make the home more energy efficient. Then you are given a report for the recommended improvements which is accompanied by the list of rebates.*

[18] Some of this information is on the website but behind a link that looks like you are making a commitment to get started.

> *It's an overall diagnosis of the problems that your house has that might be costing you money.*
>
> *Very detailed study of leakage in the home.*
>
> *You learn things that you would never think of – there are gases that are released by your stove and dryer that I never knew about. You can't just seal up your house.*

In general, HP participants are recommended additional measures for their homes by their contractors more frequently than are non-HP participants.

Table 5. Percentage of Participants Who Indicated That Contractor Recommended Additional Measures

Comparison between HP and SF (not HP or HER)

	HP	SF
Insulation (n= 37/ 133)	49%	29%
Duct Sealing (n= 55/119)	58%	40%
Air Sealing (n= 64/ 85)	55%	42%

Contractors also expressed what they felt was the value of the program – building science, third-party credibility, and technical help:

> *… differentiating ourselves with the ordinary contractors who do not have a background in building science. The value is the idea that building science is important and should be taken into consideration any time you are performing rehab work on a home.*
>
> *… it's still not easy to sell, but I think without that third-party [backing], it would be next to impossible for a lot of people… And for the homeowner, I think it also gives them some assurance that…it's just not… some contractor like… you heard in the seventies where they'd come out with the light meter and [say], "Hey, hey, you have more light around your windows. You're losing lots of energy…"*
>
> *… you've got technical help so if you run into a stumper you don't understand there is experts there that you can call and they'll try to help you.*

HP trade allies also mentioned the benefit of gaining building knowledge by being HP trade allies, specifically in terms of air leakage as well as heating and cooling loads.

Home Performance with ENERGY STAR Makes up a Small Percentage of Overall Contractor Jobs

While the overall number of HP jobs is growing, it remains small relative to other program efforts. Moreover, the three trade allies interviewed said Home Performance jobs make up only 10 to 25 percent of all their jobs.

The trade allies provided suggestions that they thought might increase customer interest in the service, particularly related to HP-specific incentives:

> *There needs to be more incentives related directly to the Home Performance within ENERGY STAR program versus just the regular incentive you would get from… the trade out - the Home Energy Solutions, the other side.*
>
> *Well yes they could incentivize the diagnostic testing itself, increase the incentives on that to lessen the burden on the home owner.*
>
> *…To not confuse the homeowners with several different programs that the Energy Trust runs at once.*

Cost is seen as a barrier to HP both by contractors and customers (discussed more below):

> *You know they're blown away by the price of everything. You know I have a lot of conversations with people but not a lot of it turns into work.*

Recommendations

- Consider providing incentives for the comprehensive home assessment itself, as well as other HP-only incentives, perhaps if the homeowner goes on to install measures. This would provide added value to the HP program that would encourage customers to participate in the whole house approach rather than just the HES incentives.

4.1.3 Trade Ally Program Requirements

Contractors must become Building Performance Institute certified in several different disciplines before becoming an HP contractor, which include Building Analyst, Air Conditioning/Heating and Envelope.[19] After BPI certification, the contractor must go through a field mentoring process and testing with an Energy Trust Performance Account Manager. Additional training involves sales, marketing and software.

Two of the HP trade allies expressed that the requirements to become an HP trade ally should be stricter:

[19] The Building Analyst series is comprised of a five day training with a written test. The Air Conditioning/Heating and Envelope series are both made of three day trainings and a written test.

> *….their minimum requirements is all you've got to really do and there is so much more to know so it could be a little harder…*
>
> *….if you want people who are serious about making homes more comfortable and more energy efficient … you should require more schooling and stricter requirements.*

During the trade ally's first year, the Home Performance with ENERGY STAR program provides incentives to jump start the contractor's new opportunities. These incentives include support for training and money for production. By incentivizing elements of the first year of participation, Energy Trust believes that the contractor will focus on the Home Performance with ENERGY STAR projects, see value in the model and ultimately earn referrals from satisfied customers. The incentives expire after one year in the program and benefits return to those in the Home Energy Solutions trade ally network. Initial incentives are needed because the Home Performance program requires the contractor to go through expensive training, purchase expensive diagnostic equipment and to change their business model to promote a more expensive, comprehensive treatment of the home.

One of the trade allies expressed the desire for the incentives to extend beyond the first year:

> *I'd prefer them to go beyond one year…. The first year or so, you really… doubt whether it was worth getting [into] it because you put out so much money and you really haven't made any profit…. I think right now… they have an incentive… if you complete twenty jobs within that first year. I think it's very difficult for most people to complete twenty jobs that first year…It would be nice if that… twenty job was… for the following year; … that you complete ten more… the next year or something; or maybe … increase that and you complete fifteen jobs the second year …*

Comments on Home Check

Home Performance with ENERGY STAR contractors use an energy calculating program developed by CSG called HomeCheck. This software supplies the customer with a cost and savings report. In early interviews with Energy Trust and CSG staff, participants mentioned that some contractors refused to use the software. As a result, those jobs are not being recorded correctly. CSG has worked to make improvements in the software to increase its user-friendliness.

When we spoke with trade allies directly, they expressed a range of opinions about the software. One said it is easy but would like it to be able to generate an EPS score and automatically retrieve utilities for the customer.[20] This person would also like the option to use any of four or five software packages including REM/Rate.[21]

[20] Energy Trust staff noted that this is only possible for CSG staff but not contractors.

[21] Note that using multiple software will make it difficult for the program to be consistent; the better option is likely to standardize one package.

Another uses the software but makes his own report for customers because the HomeCheck report does not give detailed information. He recommends:

> *I think it has to be more comprehensive in the sense that it has to have space to put everything that's tested. One of the problems is that the final printout that you get doesn't have most of the stuff that you've tested, and so if you give it to the homeowner on its own, you know, a lot of homeowners think, "Oh, that's all you did," you know; it's like "What did I pay for?" So the report, punching in the numbers is too burdensome; you know, they ask for too much and the report that it gives out gives you too little. It has to be more of a - even more of a spreadsheet where, you know, it lists everything; like when you do a combustion safety test, it should have a little thing - combustion safety test, you know, natural gas appliance, you know, carbon monoxide levels, and you know, list them; you know be more of a thing like that versus what it is more kind of - I don't know if you'd call it window dressing, but it's just kind of fluff; it's not very informative for anyone.*

As far as training, that same trade ally noted:

> *I had a number of meetings with Energy Trust to begin with, and you know, I think like three or four, and in every single one, they couldn't get it to work either; so it's very frustrating. The new version has improved a lot, I have to admit, over the last version. The last version was totally worthless. I mean it was just 'Why are you using this?'*

The third trade ally mentioned:

> *No real good experience. Well I guess some of the general data in Home Check, in the report is good, some of the background information that it supplies to the customers are good. The negatives are it's very cumbersome, it takes a very long time to get acquainted with and that we've had over three representatives of the Energy Trust to train our personal on the program and not one has been able to complete a job with our personnel.*

This company uses their own recording, processing, and reporting systems. He recommends using RESNET "because it is a much more user friendly software, it is used by many organizations across our country which is an important part of this industry is to try to standardize, nationalize some of these things…And it is I believe a much better product."

A fourth contractor, whom we did not have identified as Home Performance, mentioned without being asked: "Well actually the program that they have us running - what's the - Home Check - Home Check is not very contractor-friendly… in the amount of time we're having to put into it to process our customers isn't real beneficial to the cost of the job."

NYSERDA's Home Performance with ENERGY STAR program in New York also used HomeCheck in the past and experienced similar acceptance problems with contractors. The program then changed to a similar software called TREAT, developed by Performance Systems Development, but it still suffers from acceptance issues. NYSERDA also attempted to eliminate the data input responsibility of the contractor and instead have staff input data

from a collection sheet into the software. However, ETO/CSG noted that staff might not be as capable of interpolating data from the form as would the contractor who filled it out.

Collaboration between Trade Allies

The three Home Performance trade allies we interviewed said they use other contractors to complete HP jobs 20%, 40%, and 80% of the time. Only the trade ally that reported 20% said that the other contractors are also HP trade allies. They all have good working relationships with the other contractors with whom they work, and the contractors are either not interested in new opportunities to make alliances, do not feel Energy Trust needs to provide them with opportunities to meet other contractors, or feel that Energy Trust already provides sufficient opportunities to meet contractors with whom to work. Therefore it is not likely that HP contractors will begin exploring relationships with other HP contractors.

Process Recommendations

- Consider extending the first year incentives into the second year or moving some of the first year incentives into the second year to allow for a longer start-up time for the contractors.
- Review the purpose of the software and consider whether there is an advantage to using a modeling program over deemed savings.
- If a software program is needed, consider upgrading Home Check or moving to another software that provides the necessary information to the customer and the program.

4.1.4 Marketing Home Performance with ENERGY STAR

General population awareness of HP is limited. While two-thirds (67%; n=126) of the general population homeowners who had heard of Energy Trust were aware of HER (including 10% who had already had one), a smaller percentage (54%) were aware of Home Performance with ENERGY STAR (including 5% who had already had one).

HP trade allies also report that few of their customers (across all jobs they do, not just Energy Trust-related) are aware of Home Performance with ENERGY STAR.

When we look at how current participants found out about HP, about half (47%) of those participating in HP heard about it through marketing efforts (i.e., internet, utility, Energy Trust, newspaper, TV, radio)—and 16% heard about it from their contractors. In line with this, Energy Trust's list of trade allies was important to most HP participants (80 to 92%, depending on measure), much more so than to other single family participants (39 to 50%). In addition, HP participants visit the website in high numbers (69%) and also use the Home Energy Analyzer more often than other HES participants (21% compared to 10%).

Interestingly, according to interviews with Energy Trust and the program implementers, the primary marketing focus for the program is on leveraging the Home Energy Reviews, but only

3% of HP participants report learning about the program from an HER.[22] (This is discussed further below.)

Despite the overwhelming enthusiasm by participants, when the general population is asked about HER and HP, interest in HER is higher: 31% rated an 8 out of 10 or above in interest compared to 15% for HP. This is most likely due to the cost differential. HP participants who would not recommend the service to others most commonly reported that it cost too much or was not cost effective. The HP trade allies noted some differences in receptivity levels of customers, of course with a focus on those with disposable income:

> *It seems like it sells easier to the well let's call it the 30-50 age group. Probably in there would be the sweet spot. After that you kind of get some resistance like well I just want insulation. I don't need all that stuff and before that you run into a price barrier where people don't make enough you know if they're under 35 or 30 somewhere in there. It seems like it. They want to do it. They're earnest. They call you but they don't really…people are - you know they're blown away by the price of everything. You know I have a lot of conversations with people but not a lot of it turns into work.*
>
> *It's definitely a kind of like-minded to me who are really interested in saving energy and not worried so much about cost savings versus energy savings.*

The Distinction between HER and Home Performance Is Not Clear[23]

While HER is thought of as a mechanism for channeling customers to HP, the distinction between HER and HP is not clear. While the HER packet includes some information about the Home Performance program, including a description in the margin of the Home Energy Solutions overview and a Home Performance with ENERGY STAR pamphlet, one of the trade ally contractors expressed the opinion that the distinction between HER and HP is not made well enough through HER:

> *A lot of people call after having [an HER] and they think they've already had the Home Performance testing, so it's hard to convince them that no, you really didn't; you know, that what you had was a person coming in with a piece of paper and just kind of looking around…. I think the pamphlet that they have talks about the Home Performance, but it doesn't really compare the Home Performance with the Energy Review…So I guess giving - well I guess if they gave at the Home Energy Review, a pamphlet that compared the*

[22] The Energy Trust has created a variety of marketing materials for the Home Performance program including nine short videos for the website detailing the program's tests and inspections. The Trust also has worked to market the program through other means such as contests.

[23] The HER packet includes some information about the Home Performance program, including a description in the margin of the Home Energy Solutions overview and a Home Performance with ENERGY STAR pamphlet. This pamphlet contains a description of ENERGY STAR, an overview of Home Performance, common recommendations, and information on quality assurance.

> *two and made it more clear what the distinction is and that they haven't actually had the Home Performance, it's valuable.*[24]

Notably, when we asked non-HP contractors about Home Performance, they were also not able to distinguish between the efforts. Only one non-HP contractor had a really good idea of the difference between a Home Energy Review and Home Performance with ENERGY STAR. The majority of non-HP trade allies had absolutely no idea what the difference was or were wrong about the difference. Several of the trade allies expressed some basic understanding of the program, often noting that HER was less technical or free, while HP cost money and was more comprehensive. However, many of these expressed that they were guessing, not necessarily that they had heard this before:

> *I couldn't tell you. A home energy review is just a - from what I understand is just a walk through and they just kind of go through and do a basic walk through. The other one seems to be the more intense and I'm just guessing here. You know to do the whole house floor test and all that stuff so.*

Ways of Marketing HP

The three HP contractors described the way they differentiate between HER and HP to customers:

> *Basically the home performance test is just much more comprehensive. Usually you just tell them it takes about four hours and they go ooh. The light bulb goes on because they just had a home energy review and HER review and you know they were there 20 minutes or so. So the time helps them understand.*

> *Well I inform them that with the Home Performance review we are-it is a three to four hour diagnostic testing session. So the length and the depth of the inspection are far greater, that we are using diagnostic tools that the HER's do not use. So we're using blower doors and duct blasters and infrared cameras and other building science- based tools that the HER doesn't use. And we also have a much more information and depth of knowledge than an HER person. The typical HER person has been doing buildings for maybe six months to a year but might not know construction and may not have worked in the trades and is unfamiliar with many aspects of homes. Where we are professionals who have a vast knowledge of the systems of a home.*

> *A Home Energy review is like a trailer to a movie. The Home Energy full boat assessment is like the full length feature film…Well the Home Energy Reviews are very cursory. Your insulation looks good… It looks like you might have leaky ducts. It looks like you might have a leaky house. But then with the Home Performance, you come out and you actually test everything and verify exactly how bad it is; you get the real hard data.*

[24] Energy Trust staff suggested a side-by-side, grid-style comparison with check boxes for features of the services and price.

One trade ally expressed the following suggestion for outreach:

> *And they could also do much more community outreach as far as just on the educational level. Not so much having trying to sign people up for the HER's but just teaching people about energy efficiency and home performance in general. We have especially in this community we have lots of community functions almost every weekend or every week there's fairs and festivals and rarely is there an Energy Trust booth at these activities.*

Marketing through the Website

Home Performance with ENERGY STAR is a national program sponsored locally and available in 22 states (as of April 2009), including Oregon. We reviewed websites from a variety of state programs and found that the websites include a variety of information including assessment cost estimates, steps for participation, contractor lists, financing information, incentives, lists of tests, common symptoms, common recommendations, environmental benefits, comfort benefits, and case studies. Energy Trust's new website covers the vast majority of this information; however, not much detail is provided in any of the categories.

We found that NYSERDA's website offers a greater level of detail and more clarity of information than Energy Trust's does. NYSERDA includes a detailed list of steps, each with extensive information provided, that helps the customer understand the entire process of Home Performance from beginning to end. In addition, NYSERDA provides links to helpful documents such as a sample Comprehensive Home Assessment and a sample Certificate of Completion.

Energy Trust does provide a video on the internet that goes through the actual process of the comprehensive home assessment, which is quite useful for a homeowner. However, some of this information could also be offered in text to allow access to more people. In addition, the video only explains the assessment process and not the entire procedure of installing measures and receiving incentives.

Marketing Recommendations

- Work to distinguish Home Performance with ENERGY STAR from the free audit provided by the HES program (through marketing efforts)
  - Use the terms "building science", "technical expertise" and "whole house approach"---to set it apart from the free HER audit. This is what appears to be the valuable and distinguishing trait to customers and contractors alike.
  - Ensure that HER auditors, and possibly non-HP trade allies, are properly trained to be able to explain the difference between HER and HP to potential participants.

- Improve marketing of the HP program:
  - Leverage customer feedback and testimonials to promote the HP program to others; this may help overcome the potential barrier of cost. (Testimonials may also help to distinguish between HP and HER.)

- Continue to employ multiple forms of advertising for HP, as participants come in from a variety of sources.
- Expand marketing of the HP program specifically to increase awareness levels at least to that of the HER program.
- Explore whether the Home Energy Analyzer can be used to further pull participants into the HP program.
- Expand HP information on the website to include more detail and specificity, not only of the comprehensive home assessment, but of the entire process for assessment, installation, and close-out.

4.1.5 A Note on Savings from HP

While our impact analysis did not separate savings from HP (these are included in the single-family saving estimate); 340 jobs were completed in 2007-2008 (a small percentage of all jobs). However, the average number of measures installed per site at these homes was 6.1.[25] Of all HP sites (n=340), 5%, or 17 sites, did not have multiple measures installed. The most frequent measures installed as part of Home Performance jobs were duct work, air sealing, ceiling insulation, and floor insulation. These measures produce energy savings per unit in approximately the mid-range of all the measures rebated through the program.

[25] The database shows 15 Home Performance contractors who completed 1,034 measures at 184 sites in 2007. In 2008, 31 Home Performance contractors completed 1,063 measures at 156 sites.

4.1.6 Demographics of HP Respondents

The participant survey revealed some unique demographics of HP customers: HP participants are more likely to live by themselves (27% to 17%); More HP respondents were female (66%) than SF (44%) and HER (52%); More HP customers heat their homes primarily with natural gas (77%) than do SF participants (61%).

Table 6. Demographics of Home Performance Respondents

Demographics of Respondents	% of Group
Type of Home	
Single family detached	97%
Duplex, townhouse, row house, or small apartment with 2-4 units	-
Apartment, condo, or townhouse with 5 or more units	1%
Mobile or manufactured home	-
Other	1%
Don't know/Refused	-
Own or Rent	
Own	99%
Rent	-
Don't know/Refused	1%
Year Home Built	
2000 or later	3%
1990 to 1999	7%
1980 to 1989	17%
1970 to 1979	26%
1960 to 1969	14%
1950 to 1959	7%
1940 to 1949	9%
1930 to 1939	-
Before 1930	13%
Don't Know/Refused	4%
Size of Home	
Less than 500 sq ft	-
Between 500 and 1000 sq ft	1%
Between 1000 and 1500 sq ft	23%
Between 1500 and 2000 sq ft	27%
Between 2000 and 2500 sq ft	21%
Between 2500 and 3000 sq ft	16%
More than 3000 sq ft	3%
Don't Know/Refused	9%
Way of Heating Home	
Natural Gas	77%
Electricity	19%
Wood	1%

Fuel oil, kerosene	-
Pellet stove	-
Liquid propane gas	-
Solar	-
No fuel	-
Other	3%
Don't Know/Refused	4%
Number of People in Household	
1	27%
2	36%
3	17%
4	10%
5	4%
6	-
7 or more	-
Don't Know/Refused	6%
Income	
Less than $10,000	1%
$10,000-$29,999	1%
$30,000-$49,999	13%
$50,000-$69,999	16%
$70,000-$89,999	13%
$90,000-$109,999	13%
$110,000-$149,999	4%
$150,000-$199,999	-
$200,000 or more	7%
Don't Know	-
Refused	31%
Gender	
Male	34%
Female	66%

5. HOME ENERGY REVIEW

5.1.1 Home Energy Review In-Brief

This brief is based on a review of the program database and materials, 145 interviews with HER participants, and comments from trade allies (28 in-depth interviews).

The Home Energy Review makes up a large percentage of the overall savings of the Home Energy Solutions Program (approximately 20%). The per unit saving from HER are among the highest, and this, combined with the large number of households served, leads to a large portion of the total savings.

Overall, 11,155 people participated in a Home Energy Review in 2007 and 2008. Of these, we estimate that 55% have taken some action as a result of this effort—with about one third of all HER recipients being channeled into the Home Energy Solution rebates.[26]

Satisfaction with HER is also relatively high; however, the two greatest needs for Home Energy Review appear to be revamped training of HER auditors and additional leave-behind information for home owners.[27] Specifically, we recommend that:

- Energy Trust and CSG review the HER training to ensure that all auditors are adequately trained to provide accurate household-specific information to participants.
- Energy Trust and CSG review the current HER materials to make sure they are meeting participants' needs. While overall satisfaction with the program is high, HER recipients are not as satisfied with the quality of information they receive during the HER. In Q1 2009, the program made some changes to the materials but Energy Trust and CSG should review the new materials based on comments below to make sure they are meeting participants' needs. This will likely help increase the number of actions taken as a result of the HER. Specific recommendations are presented below and include requests for:
    - Prioritized recommendations
    - Accurate tables of cost estimates, rebate values, tax credits, and tax write-offs
    - Step-by-step instructions of how to qualify for rebates
    - Specific information about different products
    - Information on how to chose a product
    - Clear contact info
    - Lists of additional resources

[26] Note that the number of HER participants is based on the database, but the percent taking action is based on survey responses.

[27] There may be geographic differences in the data that account for some of these problems associated with the HER. However, we have not examined these differences.

One of the largest challenges that HER faces is the precarious balance between providing individuals with valuable information to help understand the costs and priorities in their home, and the need for this program to be perceived as neutral (so as not to favor some contractors or trades over others). Homeowners are asking for information about costs and priorities, so finding a way to help provide some of this information in a way that does not favor any individual contractors or trades will enhance the value of this program component.

5.1.2 Home Energy Reviews Result in Large Savings

The Home Energy Review (HER) is responsible for about a fifth of the program's energy impacts. The HER included direct installation of CFLs and savings from hot water through faucet aerators and low flow showerheads. Additionally, behaviors were recommended that would save energy in the home. All these potential actions were captured in the PY2007 billing analysis under a single variable called "HER". The per-household electric savings varied by an order of ten depending on whether the home had electric heat or not. For single family homes with electric heat, the savings were 1459 kWh and 7 therms. For single family homes with gas heat, the savings were 122 kWh and 49 therms. The reason for this large difference in kWh savings based on heating type is unclear, but is possibly due to thermostat changes for electric HVAC units or possibly that homes with electric heat were the households taking more actions without a rebate (see Figure 3). When applied to the population, the HER saved about 20% of the overall portfolio (~2.5 Million kWh and ~207,000 therms). These savings are large as the HER makes up a large percentage of program participation with over 5,000 households participating in 2007.

5.1.3 Home Energy Reviews Help Move People to Action

The ultimate goal of the Home Energy Review is to help households take energy saving actions in their homes. Based on our interviews with HER recipients, 55% of homes that received a HER took some kind of action as a result (Figure 3), and another 17%[28] are planning to take action in the future.

One of the intentions of HER is to channel households into the HES rebate program. While this "conversion rate" is tracked by the program, based on our interviews with HER recipients, 32% installed equipment and went on to receive a rebate. [29]

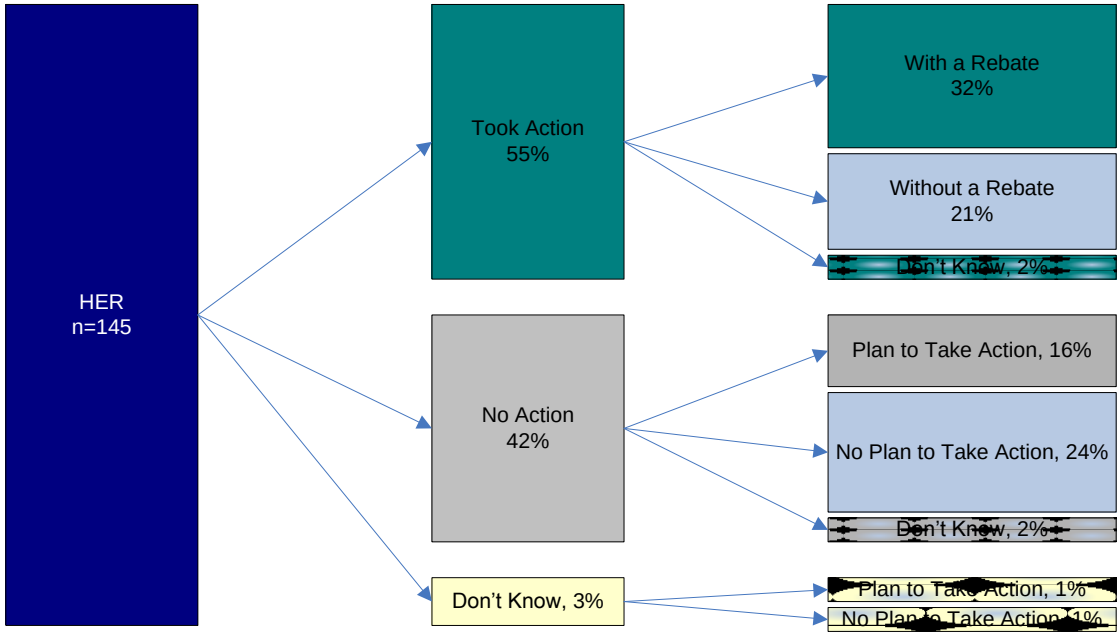
In addition to those who were fed into rebates, another 21% took an action without a rebate (as shown in the figure below). These changes were primarily equipment purchases.

For slightly over one-quarter of all homes that receive a HER, the audit does not result in any changes to their plans.

[28] This is the 16% plus the 1% of those who "did not know" if they already took action.

[29] If the household took action with a rebate, their energy savings are separately accounted for in the billing analysis and do not fall under the HER per-house impacts.

Figure 3. HER Action



Of those who took an action but did not receive a rebate (n=29), seven said the product was not eligible or did not qualify; however, six of these purchased a product in a category with an Energy Trust incentive. While this represents just 4% of all of the HER recipients that we interviewed, Energy Trust should be aware that they may be missing an opportunity for additional energy savings if HER recipients are replacing equipment with lower-efficiency products. (Notably, the savings from any additional efforts is captured in our billing analysis. Below we also discuss comments about the lack of clear information about follow-up steps and rebates.)

For PY 2007-2008, the items most commonly purchased as a result of the HER include insulation, windows, and CFLs (Table 7). (This includes purchases both with and without a rebate.) Insulation has significantly increased since the 2006 survey while gas furnace purchases have decreased.

Table 7. Items purchased as a result of HER[1]

Item Purchased	2009 Survey Percent (n=80)	2006 Survey Percent (n=166)
Insulation	54% ↑	21%*
Windows	31%	27%*
CFLs	21%	10%[2]
Water heater	10%	9%
Gas furnace	6% ↓	21%
Heat pump	6%	11%*
Duct Insulation	5%	6%*
Duct sealing	5%	6%*
Clothes washer	5%	11%

Arrows up or down indicate a statistically significant difference from past evaluation efforts at 90% level.

[1]This table does not include measures less than 5% in 2009
[2]In the 2006 report, 51% of respondents (n=200) reported installing CFLs as a conservation action. We did not compare 2009 and 2006 numbers because of this discrepancy. In addition, the number of CFLs installed during the HER has increased over the years, which might help explain any drop off in additional installations.
*In 2006 these answers also given under conservation actions; those percentages are not reported here because they are smaller.

Reasons for Inaction

For those who didn't take any action (n=62), the biggest reason was that it was too costly (42%). In addition, 29% said they did not feel they had to do anything, for example:

> *"…it wasn't recommended because we were pretty well set (didn't need any new equipment."*

> *"The water heater didn't quit yet."*

While just over half of those who did not take action said they did not know what additional information or services Energy Trust could have offered, many others suggested that they did not receive adequate information to make a change, although there was no consensus about what that information was:

> *I didn't purchase any new equipment or take action because I could not figure out how to do what they asked. They told me to go on the computer to their website and find such and such person. I couldn't figure out how to find it.*

> *They didn't give us any information or provide anything except for the CFL bulbs.*

> *I think they could have given more specific information.*

> *If Energy Trust would have given me a list of people and phone numbers I would have been able to find who to contact to start taking action.*

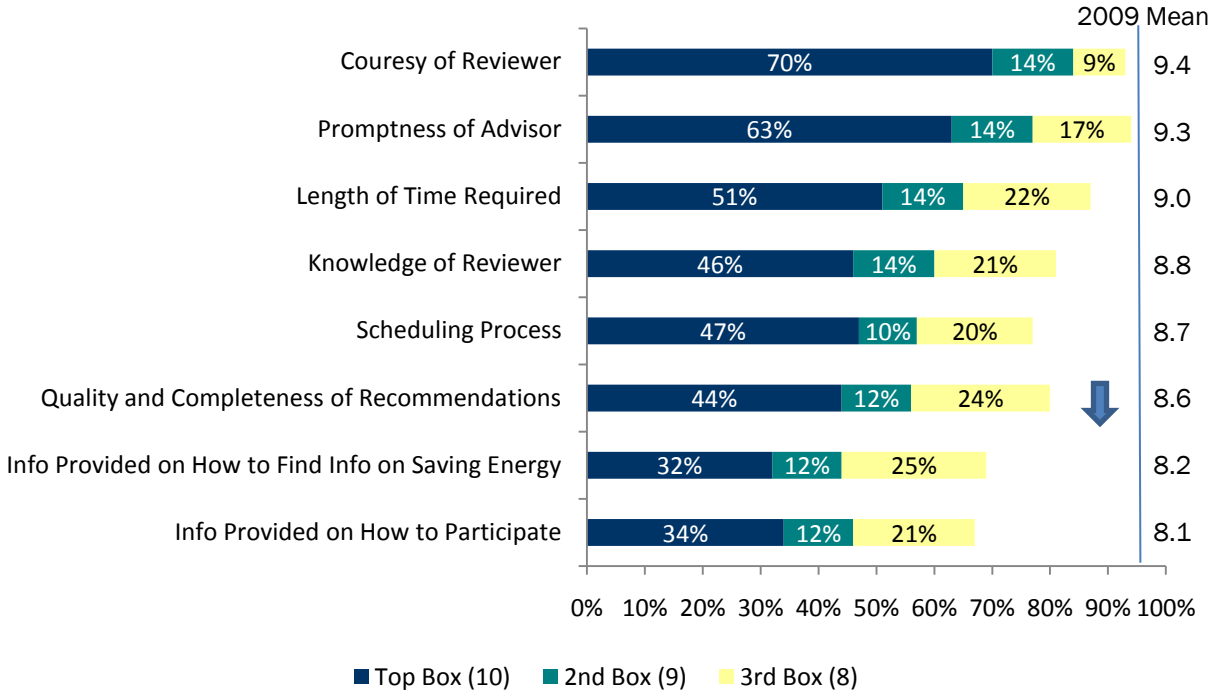
> *They would have to provide me with a far better contractor credentials and quality assurances for service than my previous experience.*

> *They could have been more specific on the costs of the equipment.*

5.1.4 Additional Education and Materials Can Improve Satisfaction

Mean satisfaction is high across the board and for the most part has not changed from 2006 (Figure 4); however, based on survey responses, HER auditors may not be providing households with energy saving information, clear recommendations, and knowledge about how to participate in rebate programs.

Figure 4. HER Satisfaction[30]



Notes: An arrow indicates that the 2009 Top 2 Box rating is signficantly different at the 90% level from the Top Box rating in the 2005-2006 process evaluation.
The mean represents the mean rating on the 0 to 10 scale.

Although 67% of respondents said they did not have any additional recommendations, based on respondent feedback related to satisfaction, the following key pieces of information could be presented during a HER to improve satisfaction and drive more households into HES rebates. Recommendations about the content of the materials included:

- **Prioritized recommendations** that include low-cost, no-cost, and high benefit-cost ratio items and behavior changes to help provide action opportunities across the participant range, especially in the current economic conditions
  - *"I feel a more comprehensive prioritized set of recommendations with the review with a more categorized list and some money saving figures that would be easier to use would be helpful."*
  - *"I feel they should list the most cost efficient and energy efficient things you could do."*
  - *"I think it would be helpful to have low cost or no cost recommendations."*
- **Accurate table of cost estimates, rebate values, tax credit, and tax write-off options** for each measure (This has likely been addressed by the new incentive grid)
  - *"I would like to know the names of some governmental programs that would help pay for the work."*
  - *"I would have liked more definitive cost estimates."*

[30] We have not examined geographic differences in the data so far; this task could be added.

- **Step-by-step instructions on how to qualify for a rebate** (possibly including a search engine to look up makes and models) and fill out the paperwork
  - *"I would have liked to receive more information of the rebates and in a clearer way."*
  - *"I would have liked to know that you couldn't receive a rebate unless Energy Trust approves it beforehand."*
  - *"The whole process to get the rebate was too complicated."*
  - *"They did not provide me with any information about how to get a rebate."*
- **Specific information (possibly fact sheets) about different products** that will save energy such as insulation, windows, water heaters, and electronics (in other words, not just rebate info)
  - *"I would like to have access to more specific information on the different products available."*
  - *"I would have liked more information on tankless water heaters."*
  - *"I would have liked to receive the information on insulation."*
  - *"I would like more information on electronics like televisions and which brands or types would be more energy efficient."*
  - *"He could have given more information on the effects of a whole house fan, the plus or minus of a solar panel for hot water or electric, and if it would work in our location."*
- **Information on how to choose a product** as well as product reviews
  - *"I would have liked to receive more information on choosing products…"*
  - *"They should have publications that have product reviews available for people to view besides online because I do not have the internet."*
- **Clear contact information** both for the program (including who to call for what specific need) and for trade allies (especially those specific to certain measures), as well as appropriate website addresses
  - *"I would have liked to have seen a website address."*
  - *"I would have liked to receive specific information on who to contact to participate in the programs."*
  - *"I would like to know specific names of contractors who know how to do the work…"*
  - *"I think they could update their references. They gave me a list that was very old. Everyone on it was out of business or no longer established."*
- **List of additional resources** related to saving energy, particularly divided by measure
  - *"He did not give much additional information."*
  - *"…more information on what web sites to visit."*

Further, recommendations about additional materials, and presentation of the materials, included

- **A condensed household-specific report** (possibly an overview informational sheet) with clear direction on how to proceed:
  - *"I would like to see clearer, plainer information slated toward the elderly clientele."*
  - *"The information needs to be condensed for the general public, to aid people in avoiding unscrupulous contractors."*

- **Paper-based information** (as much as possible) rather than referring people to the website (however matching information should be available online)
  - *"I feel it was like, 'Go to our website.' They need more printed materials."*
  - *"I would like the information in a printed hard copy, not on a computer."*
  - *"I would like to receive more written materials. The web site was not very helpful."*

CSG has received complaints from people who have waited or are still waiting for a HER in outlying areas, and our data show that satisfaction with the scheduling process is relatively low compared to some of the other attributes of the program. Those who were dissatisfied with the scheduling process reported that it took a long time to be scheduled, scheduling conflicts or difficulty making an appointment, and in one case that the scheduler did not know enough about the program. (Notably, the scheduling process for HER generally takes four to six weeks according to program implementers.)

5.1.5 Additional HER Auditor Training Is Needed

Based on our interviews with trade allies and HER recipients, there also is a need for additional training of the HER auditors.[31]

The perception among trade allies is that auditors are not adequately trained (perhaps because of the rate of turn-over within CSG) and that as a result, the recommendations that they provide to households are not always in line with the best interests of the homeowner. Comments from three trade allies include:

> *… I think that at times, I've run into situations where they will have sent out people to do in home energy audits and they will make recommendations and I find that a lot of times their recommendations are based from really bad information. They'll recommend services to people that they don't need or that can't even be done. For instance, they'll recommend duct sealing to people that don't have duct work. That's seems to me, you should be educated enough to know whether or not their ducts truly need sealing before you just recommend it. I feel like a lot of times they have what I would consider to be maybe canned presentations to where they'll say you should do this or that and not necessarily have anything based on that.*
>
> *… some of the auditors out there and what … what they recommend to the customers at times is sorely lacking.*

[31] CSG directly employs most of the auditors who complete the HERs. In outlying areas (non-Willamette valley), community action agencies, hired by CSG, also provide them. Auditors typically have sales, customer service, or environmental backgrounds. Customer services skills are particularly valued because auditors are "in and out of customers' homes all day and [they] have to interact and engage with them for the time that [they're] there." It is thought that the field aspects can be taught.

> *When they do their home energy reviews some of the things that are said to the customers are contrary to what I believe as a contractor is fact being in business for 30 years.*

Earlier interviews with program staff indicated that HER auditors are often more sales oriented (rather than technical).

According to one respondent, CSG contractors may be pushing insulation based measures.[32] (Notably, the percentage of HER recipients who installed insulation measures was up since the last evaluation. More details provided below.)

> *Predominantly because their focus tends to be on insulation and their promotions tend to recommend insulation as the number 1 thing even if customers are looking at windows when Energy Trust comes out they almost try to steer them in the direction of insulation when our customers are looking for windows… it seems I've had many, many customers report back to me saying well they almost were trying to talk us out of windows and I've gotten that response many, many times from our customers when we've recommended having the inspection the consultation (Window contractor).*

Among respondents, comments that indicated a lack of HER auditor training included:

> *I had a lot of questions and the guy did not have answers.*
>
> *I wanted to know how to get a rebate or something like that and they couldn't tell me.*
>
> *I think they should train the workers more intensively.*
>
> *He didn't have information at all about rebates or anything like that.*

5.1.6 Utilities are Effectively Marketing HER

Overall awareness of HER is high. In the general population survey, two-thirds of homeowners were aware of HERs, and 10% had participated.[33]

Among those who had not participated, on average, they don't whether they will participate in the future (the mean likelihood to participate was a 5.0 on a scale from 0 to 10). There is slightly less than one-third (31%) who reported a top three box likelihood to participate, which is higher than interest in Home Performance with ENERGY STAR (mean 3.6, 15% top three box).[34]

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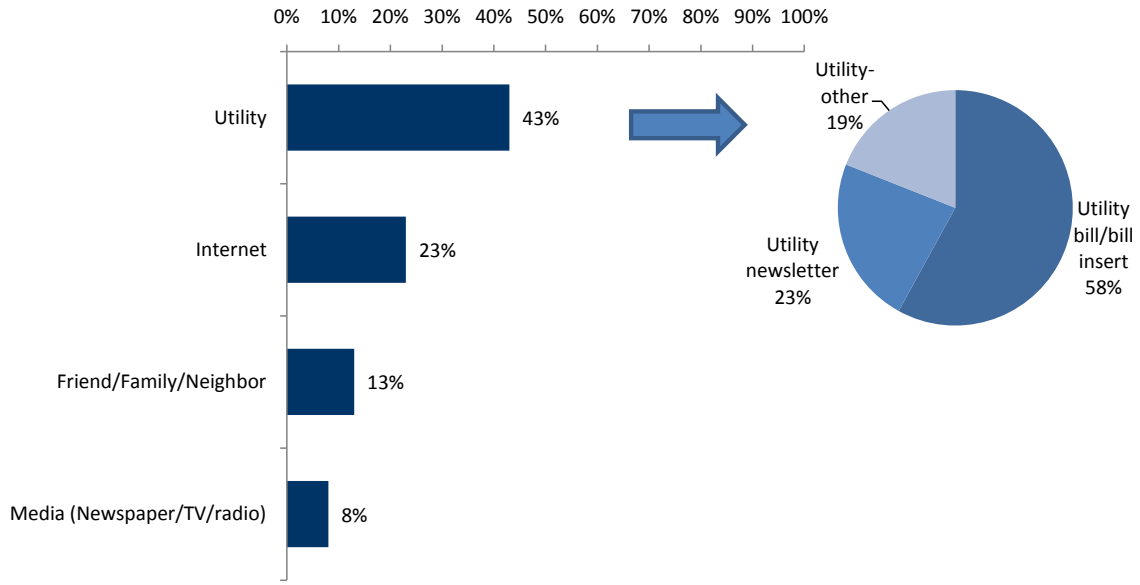
[32] Note that insulation is more-cost effective, lower cost, and required for a windows incentive.

[33] Our data did not demonstrate any differences between regions as the sample size for Eastern Oregon was only 11 and Southern Oregon only 6. However, 9 out of 11 respondents in Eastern Oregon were aware of HER, which is the highest overall percentage (but not significant at that sample size).

[34] Those who were aware of the program (based on a short description) but had not participated were asked, "On a scale of 0 to 10, where 0 is very unlikely and 10 is very likely, how likely are you to participate in this type of service?"

Currently, the utilities are an effective marketing source for this program component: according to respondents, the most common way HER recipients found out about the program was through their utility (Figure 5).[35] This is similar to the findings in the 2005-2006 process evaluation that showed 41% of HER recipients (n=513) found out about HER through a utility bill insert.[36] Our results also demonstrate that a number of individuals (23%) learned about HERs on the internet.

Figure 5. Ways that HER Recipients Found Out About the Program (n=145)



These numbers differ from how the general population heard about Energy Trust, which focused less on utilities and more on word of mouth and mass media. This may indicate that certain forms of advertising (i.e. by utilities bill inserts and newsletters rather than in mass media) are more likely to lead to participation in this program.

When discussing additional recommendations for HERs, many individuals mentioned that there is a need to get the word out better. For example:

> *"I think they should have more publicity. It is hard to find out about the program."*
>
> *"Get the word out to more people, go through advocacy programs or get involved with schools and teach the children at a young age about the Home Energy Review process."*

[35] The call center also tracks how households come to program.

[36] The 2009 survey question was open-ended and included pre-coded answers that were not exactly the same as the codes from the 2006 survey. Therefore we did not compare data directly at the utility bill insert level.

5.1.7 A Final Note on the Accuracy of the Database

During our initial investigation of the database, it was difficult to determine HER participants since this was listed as both a measure and a track. Notably, Energy Saver Kits are also included in HER. Details on how to interpret this part of the database will prove valuable for future evaluation efforts.

5.1.8 Demographics of HER Recipients

Table 8. Demographics of HER Receipients

Demographics of Respondents	HER
Type of Home	
Single family detached	94%
Duplex, townhouse, row house, or small apartment with 2-4 units	2%
Apartment, condo, or townhouse with 5 or more units	1%
Mobile or manufactured home	1%
Other	1%
Don't know/Refused	2%
Own or Rent	
Own	99%
Rent	1%
Don't know/Refused	1%
Year Home Built	
2000 or later	3%
1990 to 1999	13%
1980 to 1989	12%
1970 to 1979	26%
1960 to 1969	14%
1950 to 1959	12%
1940 to 1949	2%
1930 to 1939	1%
Before 1930	17%
Don't Know/Refused	1%
Size of Home	
Less than 500 sq ft	-
Between 500 and 1000 sq ft	5%
Between 1000 and 1500 sq ft	23%
Between 1500 and 2000 sq ft	27%
Between 2000 and 2500 sq ft	23%
Between 2500 and 3000 sq ft	12%
More than 3000 sq ft	5%
Don't Know/Refused	5%
Way of Heating Home	
Natural Gas	81%
Electricity	14%
Wood	6%
Fuel oil, kerosene	1%
Pellet stove	1%
Liquid propane gas	1%
Solar	-

No fuel	-
Other	2%
Don't Know/Refused	1%
Number of People in Household	
1	17%
2	41%
3	16%
4	19%
5	3%
6	1%
7 or more	-
Don't Know/Refused	2%
Income	
Less than $10,000	1%
$10,000-$29,999	9%
$30,000-$49,999	11%
$50,000-$69,999	23%
$70,000-$89,999	15%
$90,000-$109,999	13%
$110,000-$149,999	6%
$150,000-$199,999	3%
$200,000 or more	1%
Don't Know	2%
Refused	15%
Gender	
Male	48%
Female	52%

6. MULTI-FAMILY HOMES

6.1.1 Multi-Family Program – In Brief

This brief is based on results from a telephone survey of 2007 and 2008 multi-family participants (n=58). Of these respondents, 40 participants answered questions about insulation and/or windows as well as contractors. 88% of participants were the final decision makers; the most common job titles were: owner/co-owner (59%) and manager (21%).

Overall, 309 buildings participated in the Energy Trust Multi-Family program in 2007 and 2008. We estimate that the multi-family program makes up approximately 61% of the gross kWh savings of the Home Energy Solutions Program and 4% of the gross therm savings.

Responding managers of participating buildings report that tenants are extremely pleased with the program and acknowledge significant savings on their energy bills. About three quarters of the participating building managers are also sharing information with tenants and tenants are generally pleased. However, the managers' or owners' dissatisfaction with paperwork and contractors seems to be keeping overall satisfaction with the program at a rather low level (56% reporting a 5 on a scale of 1 to 5, mean of 4.3). Energy Trust could make some changes to raise satisfaction levels as well as increase awareness of the program. Specifically, we have the following recommendations:

Building Assessment. Satisfaction with the building assessment is very high overall. However, Energy Trust should strive to make sure that the assessors are well trained and qualified and the recommendations are written, clear, and detailed. There were several comments made about the professionalism, training, and timing of the assessor.

Paperwork. The negative experiences with the paperwork and submittal process are decreasing satisfaction levels across the board. Energy Trust should attempt to streamline the paperwork process or make sure that all participants are receiving help with as much of their paperwork as possible using contractors or CSG. (Specific recommendations provided below.)

Contractors. Even though very few participants used Energy Trust to help select a contractor, participants still project their experiences with their contractors onto Energy Trust. We recommend that:

- Although Energy Trust cannot guarantee the quality of contractors, satisfaction with the contractors reflects on Energy Trust. They should attempt some amount of contractor screening and or training to eliminate bad ones from the list.
- Energy Trust should make sure that participants know that there is a list of contractors available who are qualified to make the installations that qualify for incentives.[37]

[37] Energy Trust staff suggested instituting a higher level of QC for new contractors with little or no track record. Also either require that contractors come from the trade ally network or inform homeowners that a higher level of QC will be required of contractors not in the trade ally network.

Marketing. Very few participants hear about the multi-family program through Energy Trust; most hear about it through their contractor or word-of-mouth.

- If Energy Trust wishes to increase participation in this part of the program, we recommend that Energy Trust increase marketing to multi-family buildings by raising awareness levels. Selling points for participation (besides the obvious saving money) could include:
  - Increased tenant comfort/decreased turnover as well as a selling point for new tenants
  - Increased resale value of property
  - Green/environmental benefits
- Consider coop marketing with the Oregon BETC program to help increase awareness of both programs in the multi-family industry.

6.1.2 Energy Savings

The Multi-family program is bringing in 61% (9,020,629 kWh) of the Home Energy Solution program's gross working kWh impacts and 4% (41,985 therms) of the program's gross working therm impacts. Multi-family measures primarily include insulation, windows, CFLs, showerheads, and aerators, with windows making up the majority (57%) of the MF kWh impacts. Because the multi-family measures were not included in the impact evaluation, the ex ante numbers were passed through as the gross impact values.[38] However, the survey obtained information on the free-ridership of MF projects. We found free ridership numbers of 27% for windows, 21% for insulation, 37% for CFLs, 32% for aerators, and 15% for showerheads.

6.1.3 Building Assessment

Of those participants we interviewed, 36 (62%) reported receiving a building assessment. Of these, 81% were very involved in the process. Overall, these participants were very satisfied with the assessment, with 83% reporting a 5 on a satisfaction scale of 1 to 5, with a mean of 4.7. However there were a few negative comments related to the building assessment. In addition, some of the participants did offer suggestions to improve the process, including professionalism and timing. Comments included:

> *They didn't know as much as I; they were narrow in their scope of recommendations.*[39]
>
> *More follow up written needs and requirements detailed in written form.*
>
> *…the field people could have been more professional, they were not completely prepared; for example, this program involved energy-efficient light bulbs, showerheads, and faucet - what's on the end of the faucet - and they*

[38] Energy Trust staff noted that the multi-family savings have no associated realization rates. Billing analysis of the program did not result in stable savings estimates but did indicate that savings were significantly lower than expected.

[39] Energy Trust staff noted that assessors should be recommending low or no cost measures in addition to incentivized measures.

didn't have enough, they knew how many apartments there were. He didn't have the proper hand tools, so he couldn't get some of the showerheads off.

They need to move faster; it should take weeks, not months, to do something.

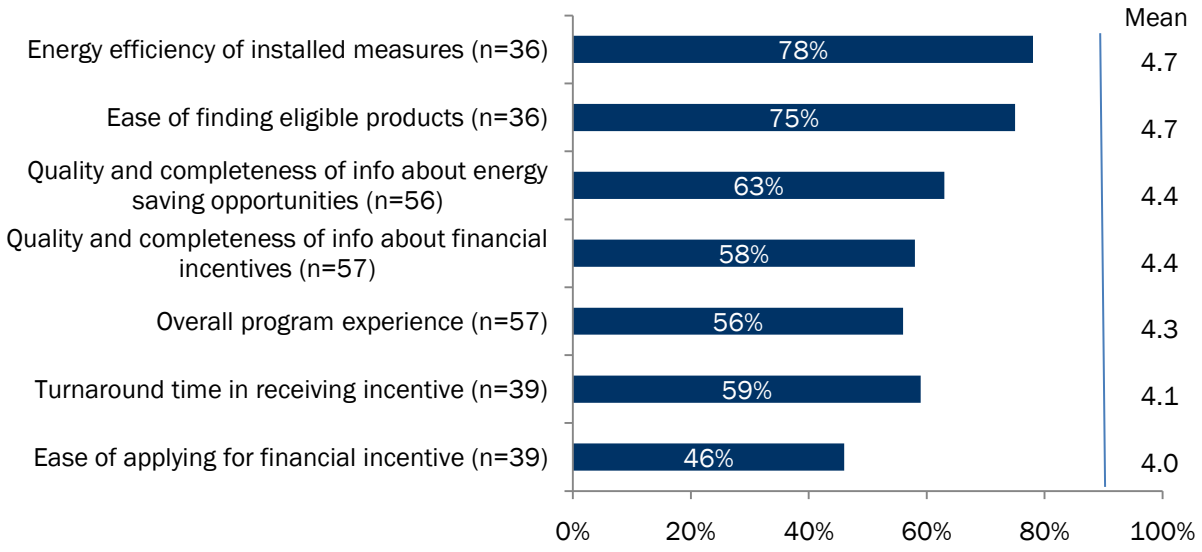
They arrived late so I already ordered the glass and it was not the right kind.[40]

Almost all participants (89%) said they received recommendations during the building assessment. The reasons for not doing anything as a result of the recommendations were "the water heater was still good," "they said we were pretty much as good as we can get," and financial or capital problems (2).

6.1.4 Satisfaction Could Improve with a Streamlined Paperwork Process

Overall, insulation and window participants are happy with the measures they installed. However, overall satisfaction with the program is only 56% top box, with a mean of 4.3. Most of the dissatisfaction reported seems to be driven by the paperwork itself and the process of submitting it. This was despite the fact that 55% received help with their paperwork, either from Energy Trust (28%) or their contractor (23%). Of those who received help, over half received assistance with most or all the paperwork. In addition, several participants mentioned problems with contractors (discussed below).

Figure 6. Satisfaction with Program (Top Box Valid %)



Notes: The questions with n's in the 30s were asked only of those who received rebates for windows and insulation. The questions with n's in the 50s were asked of all respondents.

Multi-family participants expressed only a few comments about the program overall:

[40] Energy Trust staff noted that the only requirement is U .30.

The incentives don't match up with the energy savings. There are other activities and actions that save more energy, but the incentive they offer is less.

It was sometimes difficult to figure out exactly what was required to figure out the energy savings.

There is too much to do now and you have to do it with too many qualifiers. You just want to do windows but you can't because you have to do something else on this list … just to get the initial thing done. It discourages people.

Long time lag; the incentive was not high as the estimate.

The vast majority of comments received had to do with problems with the paperwork and general confusion about the process. Some specific comments about the quantity and difficulty of paperwork include:[41]

The paperwork was cumbersome.

Because it was complicated, just if you didn't dot your i's and cross your t's, if you didn't fill out the paperwork exactly right, you wouldn't get it.

I had to resubmit the paperwork three times.

The reason was there was a lot of phone calls, and red tape, and a lot of paperwork.

We also did windows at the same time, and I didn't do one piece of paperwork at the right time, so we didn't get any incentive, no payment at all for the windows.

Some participants also mentioned problems with how their project was set-up and other handling of the paperwork:[42]

…they reclassified my participation three times - first I was residential, then I was commercial, then I was residential but only for upstairs; they lost my paperwork; they lost my incentive check.

There was just a little bit of confusion, on how they were going to set it up, whether separate buildings or as one property.

A few participants mentioned difficulty with finding the proper information:

Some of info came from the contractor not Energy Trust.

I had to do a lot…myself to find information. I would like it if they just provided this general information that I need to know on the form that is common to everybody.

[41] Energy Trust staff noted that participants, especially larger clients, should receive more assistance with participation.

[42] Note that these issues have likely been resolved recently.

> *I think we had to call back several times to follow up to find out where the checks were and how long the process would be, just general questions, I guess.*

Other feedback related to the process includes:

> *I still haven't received my rebate.*
>
> *They didn't tell me that part of it was taxable. It was a month later I got a 1099 form which meant I had fill it out and pay taxes.* [43]
>
> *I think when you go to do the app there is more than 1 contact more than 1 person; it's not a 1 on 1 contact.*
>
> *I would like to go back to the older system that was ran by the power companies because before, they would gather the money up and turn it over to the state. The power companies run it themselves with one person running the program and it ran really smooth. Now it's a government entity. Now money goes over to Energy Trust of Oregon which has created a bureaucracy … where you have to do it through them. Then now you have to sell carbon footprint dating back to them so it has become a big game in and of itself.*

However, the participants did offer suggestions for how to make the program better. Specific suggestions for improving the paperwork process include:

> *They could make it a lot less paperwork; they could be a lot more flexible as far as the timing of paperwork.*
>
> *I would like to be able to apply online and have the program integrated with the Department of Energy's program, combining it into a single application to fill out for a single program.*
>
> *A flow chart or a checklist of steps to take from start to finish.*
>
> *One person to contact.*
>
> *There should be more and better communication with owners.*
>
> *Easier information to understand what the program is all about.*

6.1.5 Energy Trust Could Place More Emphasis On Contractor Referral and Quality

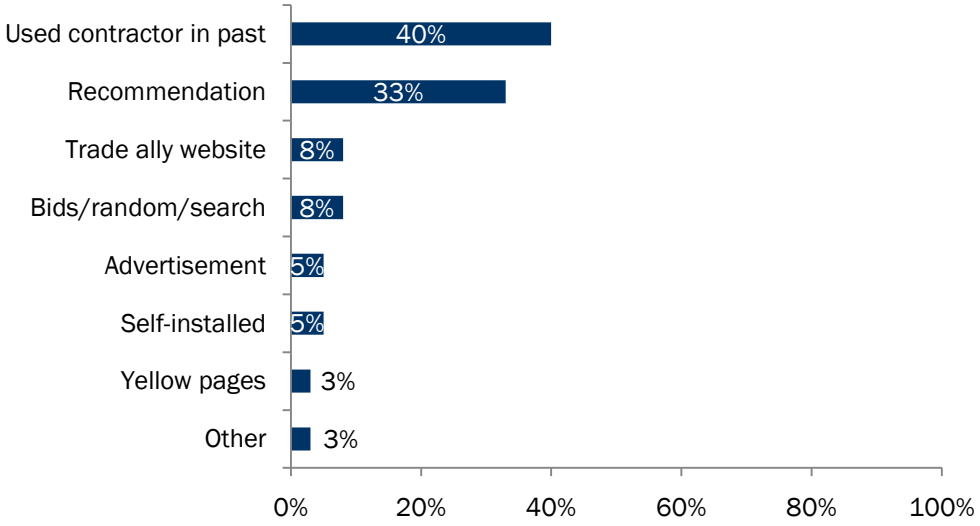
In selecting their contractors, participants relied primarily on past experience and recommendations from others, as shown in

[43] Energy Trust staff noted that this point should be clarified to participants.

Figure 7.

Figure 7. Selection of Contractors (n=40)

Multiple Response



However, when we asked directly, 26% of respondents said information provided by Energy Trust was important in selecting an insulation contractor, and 36% said the same for window contractors. One participant mentioned, "I think the only thing we had a little bit of problem was with locating somebody to do some of the work," which seems to indicate that they were not familiar with Energy Trust's lists.

Top box satisfaction with contractors was only 62%, although the mean was 4.4 on a scale of 1 to 5. Some of the problems mentioned include:

> *He was working on more than one project at the same time, so my project wasn't spaced out properly.*
>
> *There were a lot of misfits; they didn't order the right windows; we had to reorder them.*
>
> *…they sent out inexperienced workers who did a lousy job.*
>
> *Because they weren't perfect and very craftsman-like in their work; some of the work was sloppy; some of the mess was not cleaned up.*
>
> *It took too long.*
>
> *The contractors need to provide the owners with more specific information regarding the equipment they're installing.*

At least some of the participants also project their experience with their contractors onto Energy Trust and feel that Energy Trust should provide some sort of assurance as to the quality of the contractors. Specific comments include:

> *Be sure that the contractors don't provide sub-standard equipment.*

> *...the contractors took us for a unexpected ride. In my opinion they were inexperienced...[Energy Trust] need[s] to do a better job selecting and monitoring the contractors.*

Only 33% of contractors recommended other energy saving upgrades besides the ones they installed. These recommendations include: insulation (3), windows (3), doors (2), exhaust fans (1), foam sealing around floors (1), showerheads (1), siding (1), garage doors (1), weatherstripping (1), and pipe insulation (1).

6.1.6 Overall Tenants are Pleased with the Results

Managers of participating buildings mentioned overwhelmingly positive feedback from their tenants about the energy efficiency improvements they had made, and only one manager reported significant tenant turnover as a result of the project.[44] Nearly one-third (31%) of participants mentioned positive feedback regarding lower electric and gas bills:

> *They are saying they don't have to turn heat on as much.*
>
> *They're very happy, because they've experienced a 25-30 % reduction in their utility bills.*
>
> *They were happy that their heating costs went down in the cold weather and they were more comfortable in the warm weather.*
>
> *They've reduced their electric bills by a third throughout the wintertime; they were single-pane windows, and they were metal, so the new windows made a difference.*
>
> *The tenants say it's warmer and cooler; we saved 8 percent on the bill.*

Several also mentioned reduced noise pollution as a result of the windows:

> *I've heard thank yous, for the winter bills were less, the heating bills are less for the tenants and the noise level is less, our tenants are usually better educated and environmentally friendly.*
>
> *All has been good. It hasn't been totally what we'd like to see but the thing that surprised me the most was how quiet the windows were. The windows block out the noise.*

Other sample feedback includes:

> *The old windows used to ice over on the inside and now they are pleased with it no longer icing over with the new windows.*
>
> *They were delighted.*

[44] Energy Trust staff noted that some of the images presented in this section could be used in marketing.

> *They seem very pleased, and they seem pleased that I care, they like the fact that they got free stuff, they liked the showerheads and the compact bulbs, and the faucet thingys.*

In addition to the large projects of insulation and windows, many of the participants also received CFLs (46), aerators (40), and showerheads (38) for the individual units. Overall, participants believe that tenants still have over 80% of these devices installed. They did report some negatives associated with these devices, however. Most of the problems with the water measures had to do with plumbing and fit:

> *With the aerators, they created a backflow situation, so we had to remove them.*
>
> *They clogged due to new construction across the street.*
>
> *One of the buildings, because of the plumbing, they plug up easier. But overall, they say they are saving on water, hot water. They are nice showerheads.*
>
> *There is one unit with a showerhead were not happy with. I think it was dysfunctional and we could not use it.*
>
> *Some of the aerators would not go on the faucets because it's an older building and some of them would not fit on.*
>
> *The aerator and the showers head restrict flow and displease the tenants.*

Less feedback or problems were reported with the CFLs:

> *The tenants didn't like the CFLs, because they were pretty but didn't fit properly.*
>
> *Just that they weren't bright enough, the light bulbs weren't bright enough.*
>
> *CFLs were removed by tenants.*

Over three-quarters of participants (76%) shared energy information with the tenants. A few participants said they did not share information because they did not have anything to say or the project did not affect the tenants. Other reasons include:

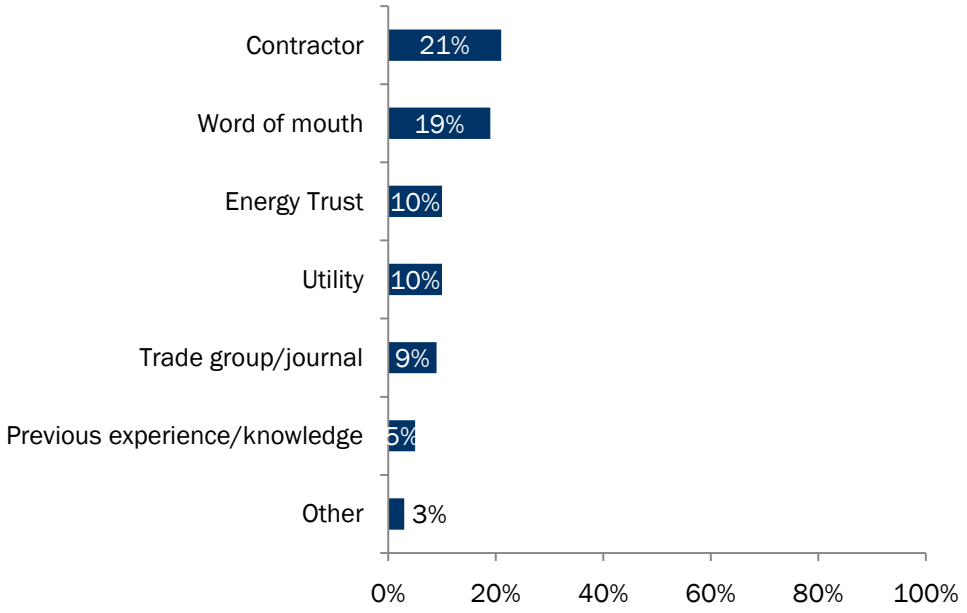
> *I didn't really have anything to help them with.*
>
> *I thought it was obvious to them that they would be saving money with the new energy efficient windows.*
>
> *My tenants are young people they are aware of such tips.*
>
> *The ungrateful tenants complained about the inconvenience of the installation process. I have since gotten rid of these tenants.*
>
> *There's a lot of turnover so some things get lost in shuffle.*

6.1.7 Energy Trust Could Ramp Up Multi-Family Marketing Efforts

Very few participants (10%) found out about the program through Energy Trust. The majority learned about it from a contractor or through word-of-mouth from peers, colleagues, friends, or family. But ultimately, nearly all participants (97%) were aware that the rebate was provided by Energy Trust.

Figure 8. How Respondents Found Out About the Program (n=58)

Multiple Response



Throughout the survey, some participants mentioned the need to increase awareness of the program:

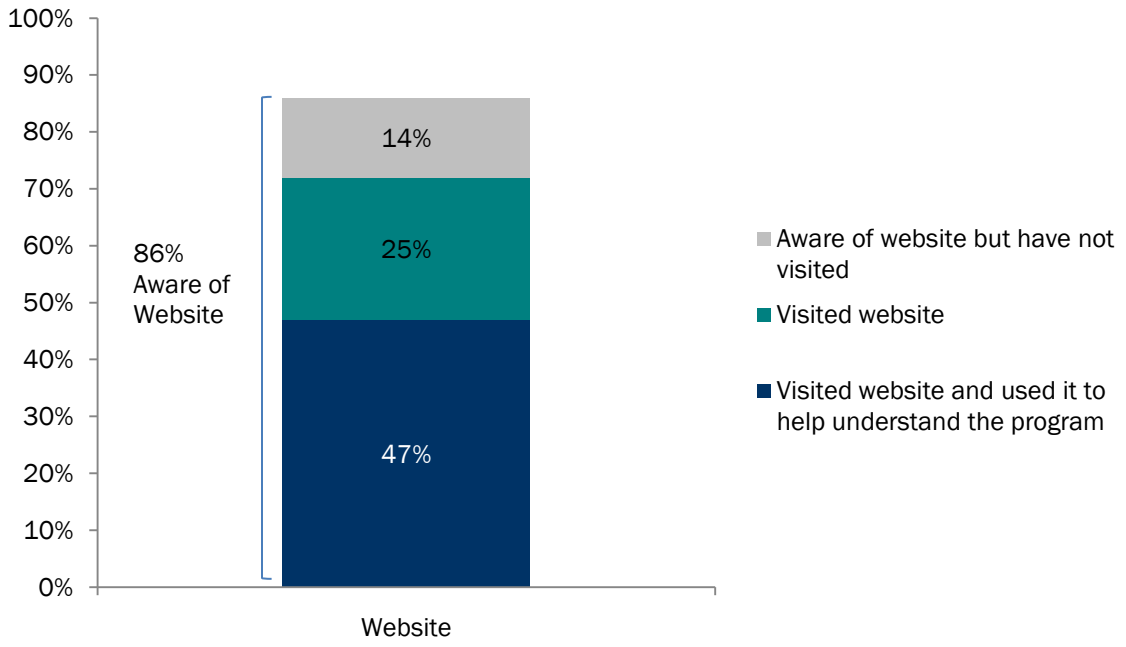
> *Try to get to more property owners through more advertisement.*
>
> *They could do mailing lists of apartment owners.*
>
> *Maybe provide more information. Make more information available to renters and rentals. I wouldn't have known about it if the contractor hadn't brought it up.*

Respondents reported a variety of methods of looking for rental industry specific information, but the primary one cited was simply an online search (29%). No other method stood out, although several mentioned real estate or trade publications (19%) such as Landlord Times.

Following participation in the program, most respondents (86%) were aware of the website and had used it to help understand the program. In combination with the data mentioned previously, it appears that the website is not serving as a marketing

awareness tool; however, it does appear to be something that helps participants navigate the process after they have already become aware of the program.

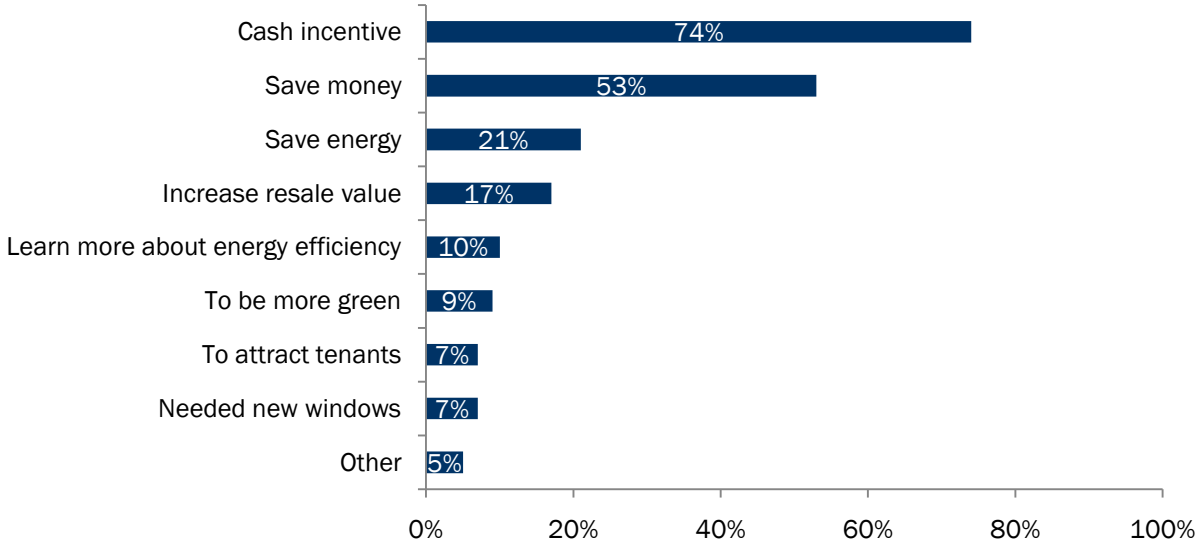
Figure 9. Respondents' Website Awareness and Use (n=58)



Respondents mentioned a variety of reasons for participation in the program, which could be used to help market it. The primary unaided reasons, of course were related to saving money. However, although only 7% reported that they participated to attract new tenants, when asked directly, 78% said they use the energy efficiency benefits as a selling point for new tenants. One participant also specifically requested literature "to be given to new resident when they open or to help sell vacancies."

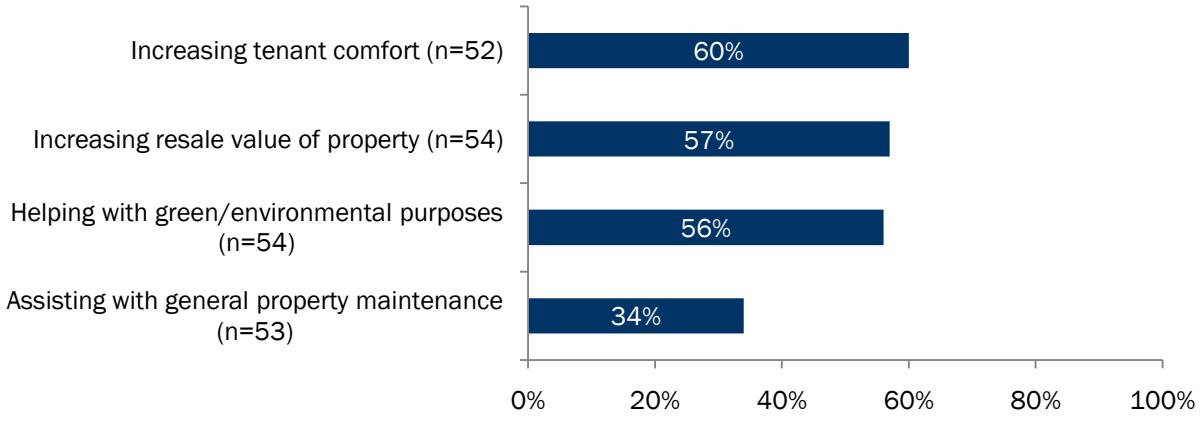
Figure 10. Unaided Reasons for Participation (n=58)

Multiple Response



In addition, when asked directly about other value the program could provide (to explore potential future marketing messages to this sector), the majority of the participants responded positively to increasing tenant comfort, increasing resale value of the property, and helping with green or environmental purposes. Interestingly, only about one-third of tenants strongly felt that the program is valuable for assisting with general property maintenance.

Figure 11. Value of Program (Top Box, Valid%)



Participants also mentioned a variety of other things they saw as value the program is currently providing or could in the future:

> *I think just a financial savings value as well as finding us vendors that are in the multifamily industry.*

It enables more affordable improvements.

The owner/property manager can keep the units rented, and the more money the management companies make, the more taxes they pay; it's all around good for the economy.

The look of the building, curb appeal.

I think they could provide some research into the real cost benefit of the various measures. They are really confusing.

Some participants mentioned education as an important value of the program:

Education about saving energy and resources.

Education of occupants.

Many of the participants were also interested in the multi-family programs expanding into other energy saving opportunities:

Expanding into other environmentally protective projects such as wind turbines and geothermal heat pumps.

The energy saving aspects are great and would like more.

Offer more incentives for whatever; for other actions and products.

More programs for energy conservation.

Only two-fifths (41%) of participants were aware of other rebates. These include the rebates from the state of Oregon (11), appliances or manufacturers (6), and utilities (5). Of the 24 participants that were aware of other rebates, 19 have received the Oregon BETC. This could indicate that the Energy Trust program is marketed better, that the Oregon program is reaching a different segment of the population, or that the BETC covers a different set of measures.

6.1.8 Properties and Future Participation

Table 9 shows the characteristics of the participating properties that respondents discussed in the interviews.

Table 9. Characteristics of Participating Buildings (n=58)

	Percent	
Tenants that have control over heating and air conditioning of units	95%	
Tenants that pay own energy bills	76%	
Units that are heated with electricity	72%	
Units that are heated with natural gas	24%	
	Mean	Median
Number of buildings on property	5	2
Total square feet of buildings on property	37,390	10,800

Two-thirds of participants reported having additional properties besides the one discussed in the survey. These participants reported on average 36 properties with 404 residential units. Nearly half (46%) of these participants say they have other buildings that have participated in Energy Trust programs, with an average of 5 buildings.[45] A large potential still remains in the other buildings that have not participated.

In addition, four-fifths (81%) of participants (n=58) reported top box likelihood (1 to 5 scale) to participate in an Energy Trust program again.[46] Two-fifths of participants are currently planning future energy efficient upgrades to their properties, mainly windows (11) and insulation (7) and alternative energy (4). Other comments include:

> *We will do all possible upgrade; some things are prohibitively expensive; large cash incentives would helpful.*
>
> *I'll have some new properties, so I'll be installing all energy efficient materials and equipment.*
>
> *We are remodeling a couple of the homes so I'm sure we'll do something.*

[45] One respondent reporting 10,000 residential units and 10,000 other buildings participating was removed from the mean calculations.

[46] Energy Trust staff noted that likelihood to participate is high despite the negative experiences reported. The experience could be improved with better QC, better communications to manage expectations, and a more streamlined paperwork process.

7. MANUFACTURED HOMES

7.1.1 Manufactured Homes In-Brief

The manufactured homes component of the Home Energy Solutions program provides verified energy savings to a market that would not be served in the absence of this program, and the manufactured homes served by this program greatly appreciate and value this service.

This brief is based on interviews with 70 participants in the manufactured homes program. Findings from our research show that:

- In 2007 and 2008, 1,669 people participated in Energy Trust's manufactured home program through eight contracting companies and CSG.[47] This part of the Home Energy Solutions program makes up 2.5% of the total savings from the Home Energy Solutions program with an estimated per unit savings of 796 kWh per home[48] from our billing analysis effort.

- This service is perceived as being valuable to recipients: 94% of respondents, including some who only received testing, said the services were valuable, mentioning lower heating bills and less waste of energy. In addition, satisfaction is extremely high: 75% of respondents rated their satisfaction as a 10, with 92% giving a rating of 8 or higher.[49] Respondents were very happy with the quality of work and the professionalism of the contractors.

- In all, 87% of the respondents that we interviewed had their home tested and sealed. The remaining homes were tested but not sealed. Notably, among those who stated that their home was only tested, four homes were mis-categorized in the database (that is, the database indicated that both testing and sealing was performed).

- This service is leading to some additional savings—more than just what is accomplished through the duct and air sealing and direct installations. In all, several respondents mentioned that their contractors made additional recommendations, and 9% of respondents took additional energy saving actions that they attribute to the program.

The recommendations for this program component are limited due to the high levels of savings and satisfaction. However, based on our findings, Energy Trust and CSG should consider the following:

- Increase program savings from manufactured homes by:
    - Providing more homes with CFLs during the service

[47] The jobs per contractor ranged from 11 to 1612, with up to 3 jobs per house.

[48] The 796 kWh is from duct sealing and/or duct insulation. However, if other measures were installed at the same time as the duct measures, this value would capture that savings as well.

[49] This was on a 10 point scale where 10 was very satisfied.

- Training contractors to continue recommending additional energy saving actions to these homes
- Finding ways to meet additional needs since a large percentage of respondents indicate that their home is in need of additional energy saving actions.

➢ Implement checks to ensure accuracy of the database so that the saving estimates are more reliable for reporting purposes.

7.1.2 Service Would Not Take Place in Absence of the Program

Overall, this service would not be taking place without the program. Only three people said they would have done it without the program – two within a year, and one more than a year later. We calculated a free ridership rate of just 0.5%.

None of the respondents mentioned having received other weatherization or similar services.

7.1.3 High Energy Savings Per Home[50]

Based on our billing analysis, the savings from the duct sealing or duct insulation measures are among the highest (fourth highest behind heat pumps, HER, and ceiling insulation). Energy Trust's ex ante value for each manufactured home is 760 kWh and 71 therms.[51] Our billing analysis of the PY2007 homes supports the ex ante value for this measure. The recent billing analysis found a savings of 796 kWh for manufactured homes with electric heat. Note that this per home savings also includes other measures installed in the home. For the measures included in the PY2007 program, the savings (450,536 annual kWh) were 2.5% of the overall impacts of the portfolio.

Three Quarters of CFLs Installed, But Many Did Not Receive CFLs

Sixteen respondents reported receiving CFLs, with a mean number of 4.8. Of these, at least three-quarters still have the bulbs installed (an additional three participants do not know if they are still installed). Five respondents commented that their households are happy with the amount of light from CFLs, though three respondents complained the amount of light was too low.

We only asked CFL questions to those participants noted in the sample as having received CFLs, as well as to those participants who mentioned that they received CFLs. Therefore it is possible that some of the other participants did receive CFLs and are not captured here. However, there are likely many homes that did not receive CFLs; if distributed, this could lead to additional savings.

[50] There were insufficient homes in the PY2007 program with gas heat to determine a therm savings value through the billing analysis.

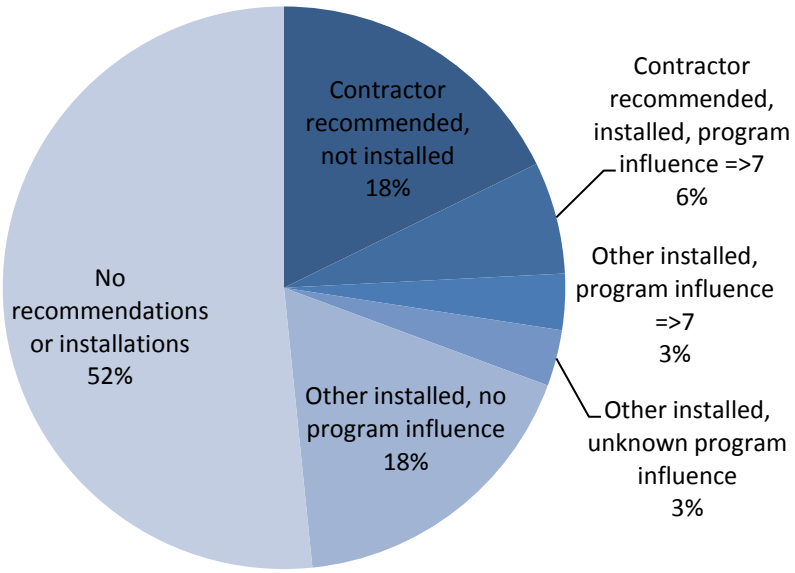
[51] Note that our engineering analysis could not assess this measure.

Contractor Recommendations and Program Interactions Led to Additional Savings

Notably, contractors are making recommendations for additional savings, and the program is leading to savings beyond the measures provided by the program (duct/air sealing and CFLs). Nearly one-quarter of respondents reported that their contractor recommended additional measures for their homes. These recommendations were mostly high-cost measures, including new or upgraded windows (5), insulation (2), a new heat exchanger (1), new doors (1), new roofing (1), new heat pump (1), new air conditioner with placement recommendation (1), and fixing exposed areas under trailer (1). Some contractors also mentioned lower-cost measures including curtains (2) and heater and air conditioner filters (1).

In total, 31% of respondents took additional energy saving actions following the program; 9% did so with a program influence of 7 or higher, meaning that energy savings can be attributed to the program. These savings are included in the billing analysis estimates above.

Figure 12. Additional Program Influences (n=62)



The additional measures taken as a result of the program included a water heater, furnace, door, heater and air conditioner filters, window blinds, additional CFLs, and non-central air conditioners.

7.1.4 Very Valuable Service for Recipients

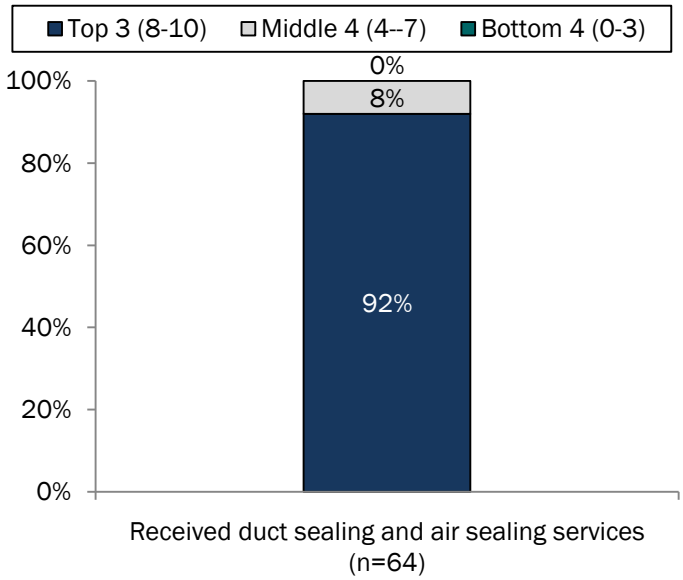
Nearly all respondents (94%) said that the testing and sealing services were valuable. Several respondents mentioned that the services "cut [their] heating bills down," while other respondents said it was "important to know there was no major waste of energy" in the home. One respondent praised the services, saying they "made my home better to live in."

The vast majority of respondents (92%) rated their satisfaction with the air sealing and duct sealing services in the top three (8-10 on a 0-10 scale). The lowest rating of the services received was a five. Three-fourths of respondents (75%) rated their satisfaction a 10. Of the respondents who gave low scores, one mentioned that the contractor was rude but still rated the service as valuable "I guess," one said that the contractors did not explain what the changes they made were, and the third said that "their workmanship was slipshod" and they left a mess.

Of those who were satisfied, many noted that the contractor explained everything they did and that everything was checked very carefully. Other comments included:

> *They did very good work. I used to be a professional carpenter so I am a pretty good judge of workmen. And these people were excellent. Also they gave us good pointers about things we could do to keep the home healthy and energy efficient.*
>
> *You could not have asked for better service. They were prompt, polite, very efficient, and clean.*
>
> *I don't know exactly what it is they measure air loss by but they showed us that we were losing 273 when our air-conditioning was on. After they did the sealing to prevent leaks it was down to 75.*

Figure 13. Respondents' Level of Satisfaction with Air Sealing and Duct Sealing Services



The high levels of satisfaction are further supported by the fact that the majority of respondents (38 of 70) heard about the service through a neighbor, park manager, or in the park office:

> *I was so happy with it that I was almost dancing in the streets. I told my neighbors about it.*

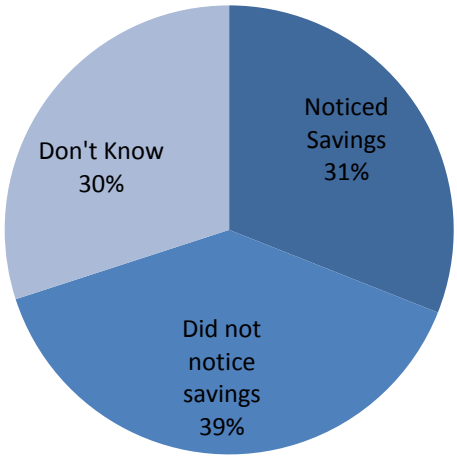
Among those who heard about the service another way, seven respondents heard about it from the utility and seven respondents from mass media.

Most respondents (90%) also seemed pleased with the length of time it took to receive the services, reporting that the service provider arrived in one week or less after they called. Four respondents mentioned that they waited longer than a week but less than month. Only two respondents mentioned waiting more than a month, one mentioning waiting a few weeks and the other a couple of months. The average wait was roughly a week.

7.1.5 Only a Third of Participants Noticing Savings

Despite high levels of satisfaction, and the results of the billing analysis, only about one-third (31%) of respondents said that they noticed a change in their energy bills after the duct sealing and air sealing. However, nearly as many (30%) said they did not know for sure either way.

Figure 14. Number of Respondents Who Noticed a Change in Their Energy Bills after the Air Sealing and Duct Sealing (n=64)



Of those who knew that their energy bill decreased, the amount of savings ranged widely, from $2 to $100, but only one respondent mentioned less than $10 in savings. Four respondents gave savings in terms of percents rather than dollars, ranging from 5% to 20%. Reasons for not being able to identify savings included not personally handling or closely reading the bills (8), seasonal changes (6), rate increases (5), fixed payment plan (2), and change in number of residents (1). Note that the interviewer said that although most people had not tracked the difference in their energy bills, they seemed to feel more secure now that the service had been done.

7.1.6 Participants Expressed Additional Needs

Over one-third of manufactured home participants (38%) expressed a need for additional energy savings services. Most of these respondents mentioned high-cost measures, such as replacing windows (five mentions), installing a new furnace (five mentions), or upgrading the insulation (two mentions). Three people mentioned multiple high-cost measures, such as installing a furnace and a heat pump (one mention). Three respondents mentioned the need to do "something" about their windows without mentioning anything more specific.

These individuals are not taking these actions on their own. Price was the barrier respondents mentioned most often (seven mentions).

Some respondents also mentioned low-cost measures and practices, such as covering windows (two mentions) and reducing air conditioner use (one mention).

These opportunities could translate into additional energy savings if the Energy Trust program can find ways to help these individuals take additional action.

7.1.7 Marketing Most Likely Not Needed

About seven in ten respondents (69%) said they were aware that Energy Trust provided this service even though the service is mostly marketed by contractors.

Since contractors and word-of-mouth are effective, additional marketing might not be needed; however, if Energy Trust and CSG are considering future marketing for this program component, respondents recommended spreading word via word-of-mouth (18) or bulletin boards or newsletters in the parks (14). In addition, 14 respondents suggested ads on newspapers, radio, or TV, and 10 suggested utility bill inserts.

However, one respondent mentioned:

> *The big problem is that people don't seem to want to believe that you can really save money by these kinds of programs. I don't know how you get around that.*

When marketing the program, it is important to note that for the most part, recipients of this measure are not familiar with the terms and do not really know what duct or air sealing is. They understand that their homes were made more air tight, and that leaks or holes were fixed, but do not fully understand the technical terms or actions taken. When marketing this program, therefore, it is important to speak the language of the individuals in these homes and not rely solely on the terms air and duct sealing.

7.1.8 A Final Note on Accuracy of Database

Opinion Dynamics contacted three people who had no memory of the testing service. However, most people in the sample are older and were often unsure of details, so we cannot assume this is a database problem rather than simply a recall problem.

Notably, among those respondents who stated that their home was only tested, (not sealed), four were mis-categorized in the database, that is, the database indicated that both testing and sealing was performed. This represents about 6% of our sample.[52]

Additionally, the number of individuals who stated they received CFLs did not agree with the database: two people for which we had a record of CFLs did not recall them; and, several people for whom we had no record mentioned that they received CFLs from the contractor.

For reporting purposes, Energy Trust and CSG should implement checks to ensure accuracy of the database so that the saving estimates are more reliable. The program should also have a data dictionary that provides the specifics about the measure (that is, having a measure labeled as a test). Currently in the database, this measure sometimes has energy savings and sometimes does not, and this may lead to errors in how people account for actions in the database.

7.1.9 Demographics of Manufactured Home Participants

Table 10. Demographics of Manufactured Home Participants

Demographics	% in Group
Type of Home	
Mobile or manufactured home	100%
Rent or Own	
Own	94%
Rent	3%
Refused	3%
Year Home Built	
Before 1930	3%
1950 to 1959	2%
1960 to 1969	6%
1970 to 1979	26%
1980 to 1989	21%
1990 to 1999	33%
2000 or later	9%
Size of Home in Sq Ft	
Less than 500 sq ft	2%
Between 500 and 1000 sq ft	14%
Between 1000 and 1500 sq ft	41%
Between 1500 and 2000 sq ft	24%
Between 2000 and 2500 sq ft	5%
Between 2500 and 3000 sq ft	3%
More than 3000 sq ft	0%
Don't Know	12%

[52] We note that in the sample it appears that "duct tests" for manufactured homes have working kWh attached to them. This is not the case for the SF program component.

Demographics	% in Group
How Heat Home (Multiple Response)	
Electricity	100%
Natural Gas	3%
Wood	2%
Number of People in Household	
1	55%
2	35%
3	6%
4	0%
5	3%
6	0%
7 or more	2%
Household Income	
Less than $10,000	14%
$10,000-$29,999	36%
$30,000-$49,999	21%
$50,000-$69,999	5%
Refused	24%

8. ENERGY SAVER KITS

8.1.1 Energy Saver Kits In-Brief

This chapter discusses the findings from the Energy Saver Kits survey conducted by Opinion Dynamics in August 2009. Overall we interviewed 252 recipients of the kits.[53]

In 2008, Energy Saver Kits were mailed to 12,812 homes.[54] There were two main types of kits sent out to Pacific Power customers based on fuel type of the recipients' water heater. Homes with electric water heaters received four CFLs, one showerhead, and two faucet aerators. Homes with gas water heaters received six CFLs only. These kits also contained a checklist with energy saving tips.

In gross, the kits are providing 44% of the kWh savings that could be expected based on kit type, numbers in the database, and engineering estimates for the measure contents. Net savings (including free ridership and spillover) are 34% of expected. This reduction from the potential is due to the fact that not everybody reported receiving what they were supposed

[53] We interviewed 6 participants who received Northwest Natural Energy Saver Kits. These participants' responses are included in the data reported throughout this survey; however, they are not included in the impact calculations.

[54] This is the number verified in the review of databases. The database indicates 11,633; however, there were multiple entries for some records.

to, only 58% of items received in the kits are installed, some CFLs replace older CFLs, and the fact that many people indicate they would have purchased the items anyway. The kits are also providing unexpected therm savings as a result of those participants with gas water heaters who reported receiving water measures.

However, in addition to the savings estimates reported above, 25% of kit recipients have taken some type of action suggested by the accompanying checklist that may result in further energy savings attributable to the program.

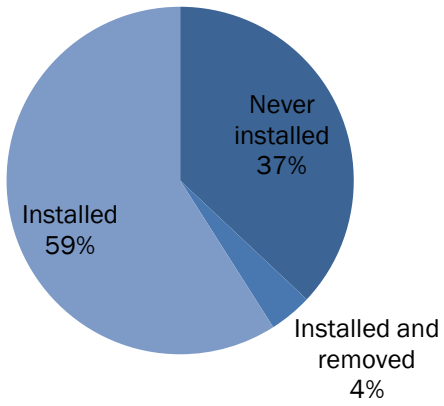
Overall, respondents report a high level of satisfaction with the Energy Saver Kits. Even respondents who didn't use the items were happy with receiving them. More than eight in ten respondents (83%) reported their level of satisfaction as an 8 or higher on a scale of 0 to 10. More than two-thirds (67%) rated their level of satisfaction as a 9 or 10.[55] Those that were not satisfied most frequently reported dissatisfaction with at least one of the items: CFLs were not bright enough or burned out, or aerators had problems or produced too little pressure.[56] Some also reported installation problems.

The breakdown of what happened to the measures provided by the Energy Saver Kits (showerheads, aerators, and CFLs) is shown below, along with reasons for not installing these measures.

8.1.2 Showerheads Installations

Based on our survey data, 59% of the 189 showerheads received (by 189 participants) were installed. 37% of the showerheads were never installed, and another 4% were installed and then removed.

Figure 15. Showerhead Installation (n=189)



Of those who received a showerhead but did not install it (n=70), 21% said they already had an energy-saving showerhead, 20% could not install it or tried unsuccessfully to do it on their own, and 14% said the old one works fine.

[55] The mean score for all respondents was 8.8.

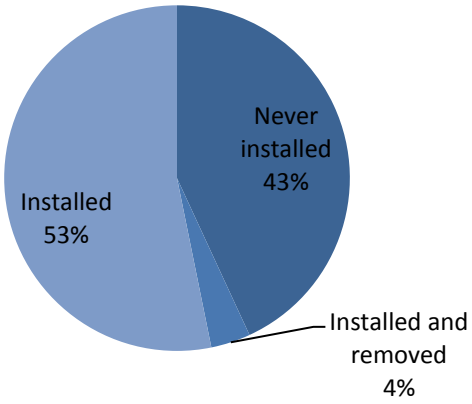
[56] Note that we have no data on why the bulbs burned out.

Of the eight respondents who installed and removed the showerhead (4% of the total showerhead recipients), three said that they replaced the showerhead with another one (of unknown flow rate). The remaining five respondents said something negative about their showerheads, with two saying it did not provide enough water pressure and one respondent preferring the household's old showerhead.

8.1.3 Aerator Installations

Based on our survey data, 53% of the 298 aerators received (by 149 participants) were installed. 43% were never installed, and 4% were installed and removed.

Figure 16. Aerator Installation (n=298 aerators)



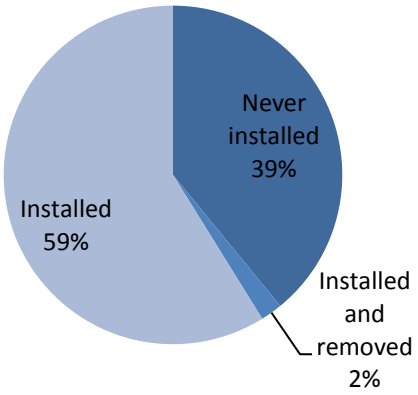
Of those individuals who received an aerator but did not install them (n=29), 34% said they did not have time or had not gotten around to it, while 21% said it did not fit or they were not sure how to install the item. Of the ten respondents who removed at least one aerator, three said it did not have enough water pressure. Two said it broke or did not work correctly.

8.1.4 CFL Installations

Based on our survey data, 59% of the 1,008 bulbs received (by 238 participants) were installed.[57] 39% were never installed, and 2% were installed and removed.

[57] We did not ask respondents how many bulbs they received; only how many they installed. Because of the inconsistencies between the database and the responses, we do not know for sure how many received 4 bulbs and how many received 6. Therefore, for the most part this data assumes that four bulbs were received per respondent unless they reported installing five or six.

Figure 17. CFL Installations (n=1,008 bulbs from kits)



Of those who received and installed CFLs, 16 respondents reported that they removed at least one CFL later (2% of all bulbs). Most (13) reported that they removed the bulbs because they burned out. In addition, 10 respondents reported throwing the bulbs away in the garbage; only two said they recycled them.

8.1.5 Savings from the Kits

Energy Saver Kits are a 2008 program and therefore not included in our billing analysis and roll-up of energy savings. Therefore, in order to calculate savings we started with the program's engineering estimates for kWh and therm savings for CFLs, showerheads, and aerators.

We started by calculating an ex ante total by multiplying the per item savings estimates by the number of items of each type in each kit.[58] In other words, we assumed that everyone in our sample received the kit contents that they were supposed to receive based on their measure code and that they installed all contents with no free ridership. We used kWh and therm savings where appropriate based on the measure code (and accordingly the water heater fuel type) of the participant, and also used different engineering estimates for those reporting single family or multi-family homes.

Equation 1. Ex Ante Kit Savings

$$Ex\ Ante\ Savings = Number\ of\ Measures\ in\ Kit * \frac{Savings}{measure}$$

In order to calculate ex post gross savings for the program we started with the per item savings estimates, multiplied them by the number of items received by each participant (instead of what was supposed to be in the kit) and then applied self-reported installation rates.[59] Although not indicated in Equation 2, we also adjusted the CFL savings to remove

[58] Kit contents: ESKLB – 4 CFLs, 1 showerhead, 2 aerators; ESKLO – 6 CFLS; ESKNWN and ESKNWN2 – 1 showerhead and 2 aerators.

[59] We assume that even if participants did receive items and simply do not recall them, they still did not install the items. For this reason, we reduce gross savings by both percent received and installation rate.

those 28% of bulbs installed that replaced old CFL bulbs (and therefore are not expected to create savings). To move from gross savings to net savings, we multiplied by NTGR (i.e., Free ridership plus spillover- shown in Equation 2).[60]

Equation 2. Ex Post Gross Savings

$$Ex\ Post\ Gross\ Savings = \ Number\ of\ Measures\ Received * \frac{Savings}{measure} * Installation\ Rate_m$$

Where:

m=measure type

$$NTGR = (1 - Free\ Ridership) + \ Spillover$$

Equation 3. Ex Post Net Savings

$$Ex\ Post\ Net\ Savings = \ Ex\ Post\ Gross\ Savings * NTGR_m$$

Where:

m=measure type

$$NTGR = (1 - Free\ Ridership) + \ Spillover$$

The values and calculation results are shown in Table 11.[61] Measure specific calculations for installation rates, free ridership, and spillover are shown at the end of the report. We calculated per home estimates for our sample and then extrapolated those numbers to the total population that received kits. There are ex post therm savings but not ex ante therm savings because of the Lighting Only participants (with no expected therm savings) reported receiving water measures (with expected therm savings).

[60] We used replacement of older CFLs to adjust gross savings and free ridership to adjust net savings. In addition, we asked free ridership per participant, not per bulb, and therefore are not able to distinguish free ridership by bulb as some participants replaced both incandescent and older CFLs.

[61] Note that these calculations assume that comparable choices are made between types of homes; i.e. that the spillover rate is the same in single family versus multifamily.

Table 11. Energy Saver Kit Energy Savings Calculations

		Measure	#	n	per unit kwh	per unit therms	Ex Ante kwh	Ex Ante therms	Received	Percent Received	Installation Rate	Replaced incandescent	Ex Post gross kwh	Ex Post gross therms	Free Ridership	Spillover	Net to Gross Ratio	Ex Post net kwh	Ex Post net therms
Kit A Lighting and Bath (Electric Water Heater)	Single Family	CFL	4	194	75		58200		169	0.87	0.59	0.72	21537		0.51	0.26	0.75	16153	
		CFL	6	0	75		0		14	NA	0.59	0.72	2676		0.51	0.26	0.75	2007	
		Showerhead	1	194	473		91762		168	0.87	0.59	NA	46884		0.27	0.07	0.8	37507	
		Aerators	2	194	134		51992		129	0.66	0.53	NA	18323		0.3	0.04	0.74	13559	
	Multi-family	CFL	4	6	63		1512		6	1.00	0.59	0.72	642		0.51	0.26	0.75	482	
		Showerhead	1	6	336		2016		5	0.83	0.59	NA	991		0.27	0.07	0.8	793	
		Aerators	2	6	95		1140		5	0.83	0.53	NA	504		0.3	0.04	0.74	373	
	Totals	**Total**					206622						91558					70874	
		Per Participant (n=200)					1033						458					354	
		Extrapolated (N=8294)					8568614						3796890					2939129	
		Measure	#	n	per unit kwh	per unit therms	Ex Ante kwh	Ex Ante therms	Received	Percent Received	Installation Rate	Replaced incandescent	Ex Post gross kwh	Ex Post gross therms	Free Ridership	Spillover	Net to Gross Ratio	Ex Post net kwh	Ex Post net therms
Kit B Lighting Only (Gas Water Heater)	Single Family	CFL	6	43	75		19350		43	1.00	0.59	0.72	8220		0.51	0.26	0.75	6165	
		Showerhead	1	0		22	0		9	NA	0.59	NA		117	0.27	0.07	0.8		93
		Aerators	2	0		6	0		8	NA	0.53	NA		51	0.3	0.04	0.74		38
	Multi-family	CFL	6	3	63		1134		3	1.00	0.59	0.72	482		0.51	0.26	0.75	361	
		Showerhead	1	0		15	0		2	NA	0.59	NA		18	0.27	0.07	0.8		14
		Aerators	2	0		4	0		2	NA	0.53	NA		8	0.3	0.04	0.74		6
	Totals	**Total**					20484						8702	194				6526	152
		Per Participant (n=46)					445						189	4				142	3
		Extrapolated (N=4518)					2011885						854649	19042				640987	14884
Overall		**Overall Extrapolated Total**					10580499						4651539	19042				3580116	14884
		Realization Rate											0.44					0.34	

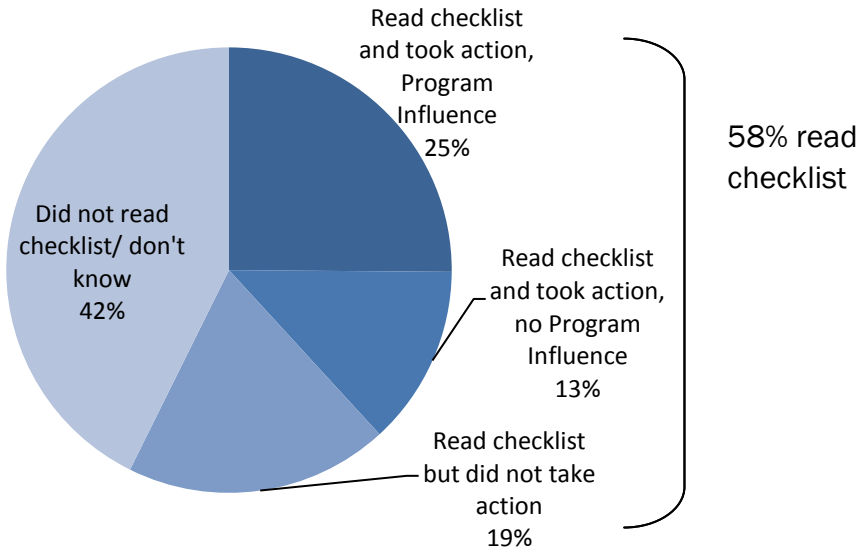
Additional Notes on Savings

Of the total installations of CFLs from the Energy Saver Kits in our sample that are still installed (n=592), nearly half (46%) are high-use bulbs, meaning that respondents leave them on for three hours or more per day. In the future, this could also be used to adjust estimates of energy savings.

8.1.6 Additional Savings from the Checklist

In addition to the free measures, the Energy Saver Kit also provides customers with a checklist of actions with the hope that they will review this list and take additional actions in their home.[62] Some 58% of recipients of the kit read the checklist, while the remaining 42% did not read the checklist. Overall, 38% of participants both read the checklist and took additional energy saving actions based on the checklist. 25% of participants attribute their actions to the program, giving it an influence of more than six on a scale of 1 to 10. Other influences reported included the desire to save money and energy.

Figure 18. Number of Respondents Who Took Actions from Energy Saver Kit Checklist (n=252)



Value of the Kit and Information

Of those who read the checklist, 41% said the information was new, and another 35% reported that although the information in the checklist was not new, it increased their interest in energy saving efforts they were already considering (for a total of 76%). This is consistent with the fact that more than three-fourths (77%) of all respondents who read the checklist said the information was very useful (8 and above on a scale of 0 to 10).

[62] We are currently working on the calculation of energy savings based on data discussed in this section.

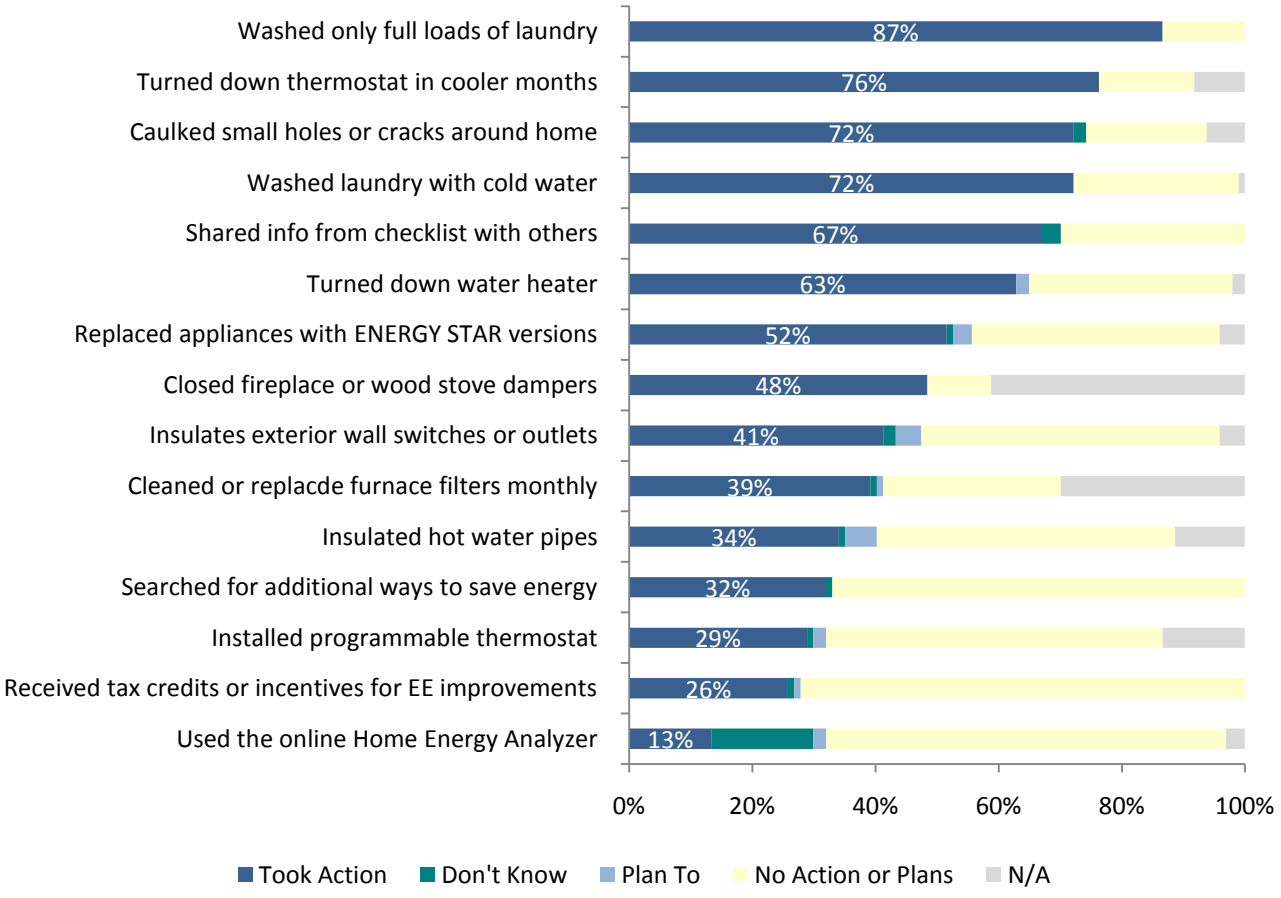
Actions Taken as a Result of the Checklist

Of those who remembered taking action (whether attributed to the program or not), the top three actions respondents mentioned unaided were caulking small holes and cracks around the home (22%), installing gaskets or insulation around exterior wall switches or outlets (14%), and turning down the thermostat during cooler months (11%). The most commonly reported actions when aided were washing full loads of laundry (87%), turning down the thermostat in cooler months (76%), and caulking holes around the home (72%). The differences between unaided and aided mentions may be a result of a few things. If the respondent took an action some time ago, they may simply have forgotten about it until reminded. However, some actions such as washing full loads of laundry and turning down the thermostat may have become so habitual that respondents do not even think to mention it as an energy saving action.

The actions taken, including turning down the water heater (63%) and replacing appliances with ENERGY STAR versions (52%), could result in significant energy savings. Furthermore, 28 respondents who already took action also have plans to take additional action; the actions are noted in Figure 19. (Only 13 respondents who have not yet taken any action have plans to, but they are not included in the chart because of the different n.)

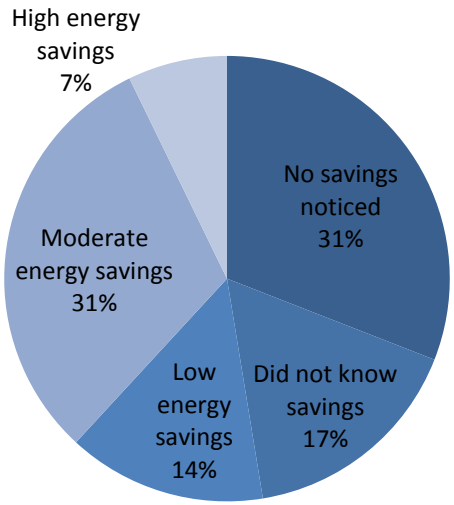
Figure 19. Actions Taken

(n=97 who took action)



Those who took action reported a wide range of energy savings.

Figure 20. Approximate Energy Savings from Actions Taken (n=97)



Another 28% (41) of respondents who looked through the checklist said they had plans to take action within the next twelve months. This includes just 13 people who had not yet taken any action. The most common actions mentioned were insulate hot water pipes (9 people), caulk small holes (6), install gaskets or insulation around outlets (5), and replace/upgrade windows (5).

8.1.7 Accuracy of the Database

Based on our research, we found a few discrepancies between the data we received from Energy Trust and what respondents reported receiving, particularly related to the type of Energy Saver Kit that participants were supposed to receive. In the pre-test that we monitored, one participant reported not having received a measure that should have come in her kit according to her measure code. As a result, we changed the survey to ask respondents what came in their kits, to avoid having the data show a too low percentage of installations. Discrepancies in this data are shown in Table 12. Some of these may be a result of recall, but there seem to be instances both of participants receiving an item they should not have and not receiving items they should have.

Table 12. Discrepancies in Database

Discrepancy
General (not included in survey)
111 people we called (out of 1952 total and 395 people who started the survey) did not verify receiving a kit[1]
6 people requested a kit but have not received one yet
Survey Respondents
2 people who received Pacific Power kits said Pacific Power was not their electric utility
40 more people reported receiving a showerhead (189) than aerators (149)

Discrepancy
Gas vs. Electric
14 people (at least) listed as Lighting and Bath said they received more than four bulbs
11 people listed as Lighting Only reported receiving a showerhead
10 people listed as Lighting Only reported receiving aerators

[1] Because we obtained these names and telephone numbers from look-ups based on the addresses provided by Energy Trust, it is likely that some of this inconsistency was due to incorrect look-ups or previous residents who had moved. (Note that we reached three people in follow up calls; one said he and his wife did not know anything about it; one said she did get a kit and had a handyman install the showerhead and aerator – her husband or son probably answered the phone and did not know anything about it; the third said he had requested a kit but never received it – this was likely before we discovered this was happening and added that specific termination option.)

8.1.8 Demographics of Respondents

Table 13. Demographics of Energy Saver Kit Respondents

Demographics of Respondents	% in Group
Gas Utility	
Northwest Natural	21%
Cascade Natural Gas	14%
Avista	1%
(None/Don't know)	65%
Electric Utility	
Pacific Power	97%
Portland General Electric	1%
Don't know	1%
Type of Home	
Single family detached	77%
Duplex, townhouse, row house, or small apartment	3%
Apartment, condo or townhouse with 5 or more units	4%
Mobile or manufactured home	15%
Other	1%
Don't know/Refused	1%
Own/Rent	
Own	91%
Rent	8%
Other	1%
Age of Home	
Less than 10 years	11%
10-19 years	19%
20-29 years	8%
30-39 years	17%
40-49 years	10%

Demographics of Respondents	% in Group
50-59 years	11%
60-69 years	6%
70-79 years	3%
80 years or more	10%
Size of home	
Less than 500 sq. ft.	1%
500-1000 sq. ft.	8%
1001-1500 sq. ft.	27%
1501-2000 sq. ft.	34%
2001-2500 sq. ft.	13%
2501-3000 sq. ft.	4%
More than 3000 sq. ft.	4%
Don't know	11%
Way of heating home	
Electricity	42%
Natural gas	29%
Liquid propane gas	2%
Fuel oil, kerosene	6%
Wood	14%
Pellet stove	4%
Other	4%
Household Income	
Less than $10,000	3%
$10,000-$29,999	22%
$30,000-$49,999	21%
$50,000-$69,999	15%
$70,000-$89,999	7%
$90,000-$109,999	2%
$110,000-$149,999	1%
$150,000-$199,999	1%
$200,000 or more	1%
Don't know	5%
Refused	23%
Gender	
Male	30%
Female	70%

8.1.9 Net to Gross Calculations

Basis of Calculations

ESK Free Ridership

There is no program influence; score is based on stated intent:

SI Var 1 (Installation) – If you had not received free CFLs from the Energy Saver Kit, which of the following three statements best describes the actions you would have taken…

1. We would not have installed CFLs in our home (0)
2. We would have installed fewer CFLs (Average SI Var 2 and SI Var3)
3. We would have installed the same number of CFLs (score from SI Var 3)
8. Don't know (0.5)

SI Var 2 (Number) – (IF SI Var 1 = 2) If you had not received free CFLs from the Energy Saver Kit, how many CFLs would you have purchased and installed on your own? (6 is the maximum provided by the program)

1 (1/6)
2 (2/6)
3(3/6)
4 (4/6)
5 (5/6)
6 (6/6)
DK/refused (0.5)

SI Var 3 (Timing) – (IF SI Var 1 = 2 or 3) If you had not received free CFLs from the Energy Saver Kit, when would you have bought CFLs?

1. At roughly the same time or earlier (1)
2. Within a few months (0.66)
3. Within a year (0.33)
4. More than a year after the kit came (0)
5. Don't know (0.5)

ESK Spillover

SP 1 – Since you receive the free CFLs in the kit, have you installed any more CFLs in your home?
SP2 – How many additional CFLs did you install?
SP3 – How influential was the Energy Saver Kit in your decision…?

Number of measure from SP2 counts as spillover if SP3 > 6 (on a scale of 0 to 10)

Measure Specific Calculations

Showerheads

Installation rate:

59% =100% - 37% never installed – 4% removed

Free ridership:

Of those who installed the showerhead, 42% said they would have done it on their own. Of these, 22% would have done it at the same time, 42% within a few months, 20% within a

year, and 8% more than a year later. These responses contribute to the free ridership rate of **27%**.[63]

[27% of 59% = 16%, or the percentage of the items received that were installed but would have been anyway without the kit]

Spillover:

Twelve individuals purchased at least 14 additional showerheads that create energy savings attributable to the program (spillover); they indicated a program influence of greater than six on a scale of 0 to 10.[64] Four others purchased showerheads but indicated lower program influence and are not included in spillover.

14 showerheads is 7% of the total received, 189. Spillover is added to the net-to-gross ratio as a percentage. Therefore 7% is added to the net-to-gross ratio (NTGR) to give a final NTGR for this measure of **0.80** (i.e., (1-.27)+.07).

Aerators

Installation rate:

53% = 100% - 43% never installed – 4% removed

Free ridership:

Of those who installed the aerators, 51% said they would have done it on their own, although some (15%) would have installed fewer, and some would have installed at a later date (33%). These responses contribute to the free ridership rate of **30%**.

[30% of 53% = 16%, or the percentage of the items received that were installed but would have been anyway without the kit.]

Spillover:

Seven respondents who installed aerators purchased additional aerators (11 aerators in total) that create energy savings attributable to the program (spillover); they indicated a program influence of greater than six on a scale of 0 to 10. One other person purchased aerators but indicated lower program influence and is therefore not included in spillover.

11 aerators is 4% of the total received, 289. This adds 4% to the NTGR to give a final NTGR for this measure of **0.74** (i.e., (1-.30)+.04).

CFLs

Installation rate:

59% = 100% - 39% never installed – 2% removed

Free ridership:

[63] In the future, energy savings calculations could be adjusted by asking what the showerhead replaced.

[64] Not everybody who reported installing showerheads as a result of the program indicated how many showerheads they installed. Therefore any showerheads those people installed are not included in spillover calculations. This is also true for aerator and CFL spillover.

Of those who installed CFLs from the kit, only 20% said they would not have installed any on their own; 27% would have installed fewer, and 42% would have installed the same number. Of those who said they would have bought fewer CFLs on their own, the mean number they would have bought was 2.8. Of those who would have installed CFLs on their own, 32% would have done it at the same time, with the rest noting some other point in the future. These responses contribute to the free ridership rate of **51%**.

[51% of 59% = 30%, or the percentage of the items received that were installed but would have been anyway without the kit.]

Spillover:

Sixty-four respondents who installed CFLs also purchased additional CFLs (at least 264 total) that create energy savings attributable to the program (spillover); they indicated a program influence of greater than six on a scale of 0 to 10. An additional 37 people purchased CFLs but indicated lower program influence and are therefore not included in spillover.

264 CFLs is 26% of the total received, 1004. This adds 26% to the NTGR to give a final NTGR for this measure of **0.75** (i.e., (1-.51)+.26).

Other Support for Free ridership

Before installing a showerhead from the kit, only 39% of respondents had previously purchased a low flow showerhead. Similarly, 36% had purchased aerators. Nearly twice as many (68%) had purchased CFLs. These correspond to the free ridership rate, which was higher for CFLs than for showerheads and aerators.

Appendix A. Early Feedback Memo

MEMORANDUM

TO: Sarah Castor and Phil Degens, Energy Trust of Oregon

FROM: Opinion Dynamics Evaluation Team

DATE: April 20, 2009

RE: Interim Results from In-depth Interviews - Home Energy Solutions Program

This memo is intended to provide Energy Trust of Oregon (Energy Trust) with early feedback on the 2007-2008 Home Energy Solutions (HES) Process and Impact Evaluation. The findings in this memo draw on our qualitative research and initial review of program materials. Opinion Dynamics conducted 24 interviews with program and market actors from December 9, 2008 through April 1, 2009. The preliminary findings described below are drawn from these depth interviews as well as from our review of secondary information such as the program logic model, marketing materials, and prior reports. Note that in most cases, these preliminary findings have not yet been supported by quantitative research or data.

Following each section, we indicate suggestions for additional research. Our hope is that this initial review of findings will help narrow the scope of our primary data collection tasks with Trade Allies, Customers, and the General Population.

Specifically, in this memo, we address the following areas.

Overall, the program appears to be working well in a number of areas. However, in this initial memo our goal is to provide early feedback on areas for possible program improvement. Note that this memo is not intended to provide recommendations (given the early stage of our research effort), rather, we are providing areas that may be in need of improvement. Highlighting these issues up front will allow us to further explore the nature and extent of these targeted areas in future data collection activities (as desired by the Energy Trust Evaluation Team). We expect that some of these areas may drop out as issues within the final report if they are not backed by findings from the upcoming quantitative data collection steps.

Customers

The aim of the Home Energy Solutions (HES) program is to convince customers of Oregon investor-owned utilities (Portland General Electric, Pacific Power, Northwest Natural Gas, and Cascade Natural Gas) to make changes in the ways their homes use energy. To this end, the HES program offers these customers:

- **Free Home Energy Reviews** (audits) show homeowners where there are opportunities to improve a home's energy efficiency; install six to eight free CFLs, a low flow showerhead and a faucet aerator; and provide a list of trade allies, fact sheets, and brochures.
- **Cash incentives for home improvements** for residential energy efficient upgrades, such as weatherization, heating and cooling, and efficient appliances.
- **Lists of qualified trade allies** who meet special requirements set out by Energy Trust to ensure that they can help customers install or select the most effective energy efficient measures and techniques.
- **Special promotions** involving incentives or bonuses for the purchase of specific energy efficient measures.

By design, the HES program connects with customers in several ways – through marketing activities, through the contact centers, through the rebates, and more. However, in the end, the connection between customers and Energy Trust and the program implementer (CSG) staff is often indirect, with trade allies, collaborators and utilities serving as the go-betweens.

Our interviews with HES staff from Energy Trust and CSG touched on the many ways that the program reaches customers. Due to the indirect connection between the interviewed staff and the customers, whenever topics around customers came up in conversation, they were inevitably linked to the modes via which they were touched, so customers are often viewed through the lenses of the trade allies, collaborators and marketing vehicles. Where this happened, we discuss the customers in sections of this memo that coincide with the "go-betweens;" in the sections entitled "trade allies" and "collaborators." In this section we discuss only the direct connections the HES staff have with customers.

Based on our initial interviews, some possible areas for improvement regarding customers include:

- **Ensuring Equity and Message Saturation Across the State:** Energy Trust's service territory covers most of the State of Oregon. Based on HES participation rates versus population distributions, Eastern Oregon, Southern Oregon, and the Willamette Valley/North Coast areas are under-represented in HES programs. Our analysis of 2007 incentives shows that participation rates are not aligned with population: 66% of participants were from the Portland metro though 47% of the population lives there. Participation in the other areas of the state is lower than population rates: 5% of participants were from Eastern Oregon though 11% of the population lives there; 2% were from Southern Oregon though 12% of the population lives there, and 24% were from the Willamette Valley/North Coast

region though 30% of the population lives there.[1] Staff and collaborator interviews also suggest that Energy Trust messaging is less likely to run in Southern and Eastern parts of the state, and the previous evaluation indicated that awareness of Energy Trust was far higher in the Northern portion (49%) of the state than in Southern (31%) and Eastern (22%) Oregon. In 2008, however, these numbers appear to be more in line with population numbers: 43% Portland, 17% Eastern Oregon, 12% Southern Oregon and 27% Willamette Valley/North Coast. Yet, the perception of the inequity still exists: in our initial review of the 2009 Trade Ally Survey data collected by Energy Trust, trade allies also mentioned:

> *"continuing to expand Energy Trust awareness and programs throughout Southern Oregon. Not just Portand metro."*

If equity is desired, the program can continue to monitor awareness and participation across the state and find additional ways to reach out to under-represented populations.

- **Helping Customers Understand the Difference Between a Home Energy Review (HER) and the Home Performance Program**: HES staff (staff from both CSG and Energy Trust) expressed concern that homeowners and many trade allies do not understand the difference between the Home Energy Review (HER) and Home Performance with ENERGY STAR programs. One staff interviewee said that consumers are confused because:

  > *"Someone from the [HER] network comes in and says, 'Well, we'll come in and do a free estimate.' And then Home Performance comes in and says, 'Well, we can do a comprehensive home assessment, but it's like $500." And the people go, "Wow, you want me to pay $500 just for an estimate?"*

  The difference between the HER and Home Performance programs is described in the detailed videos provided on the Energy Trust web site. However, there are few written marketing materials available for Energy Trust's Home Performance program that are sent out or distributed to Oregon residents, and these limited materials do not go into enough details explaining the benefits and steps in the program. Our review of the program's written materials indicates that there is insufficient detail for consumers to make informed decisions, or to sometimes know how to proceed. Other similar programs, like NYSERDA's Home Performance with ENERGY STAR program, provide customers with step-by-step information about how to participate. In Georgia, the Southface Home Performance with ENERGY STAR program also provides an example of program benefits in an uncomplicated manner. Providing customers with further details into the benefits of the program, including monetary, energy-related, comfort-related, and environmental messaging may also broaden the program's appeal.

- **Serving HER Customers in a Timely Manner**: CSG has received complaints from people who have waited, or are still waiting, for a requested HER in areas outside of the

[1] Note that the evaluation team used statewide population figures here, even though Energy Trust territory does not cover the entire state. This was the best available information. If (better) data are available, we will adjust these numbers. We also note that ETO territory map that shows wide parts (though low-density) of Southern and Eastern Oregon that are not served be IOUs and ETO.

Portland-metropolitan area. Through our in-depth interviews, it was also reported that it is harder to find available contractors, and thus serve, populations outside of the metro area. We include this here because this is an issue that Energy Trust may wish to explore with customers; however, this also appears to be an appropriate topic of discussion for trade ally interviews.

- **Placing More Emphasis on the Multi-family Community and Program**: Several respondents expressed that the multi-family program process is a more cumbersome process. To explore whether this is an internal issue, or an issue that also affects customers, we suggest exploring differences in knowledge, participation and satisfaction between single family and multi-family participants. Based on the needs of Energy Trust, we may also attempt to examine the differences in how the program intervenes between these two programs.
- **Tracking and Reporting Outcomes from Energy Trust Marketing Efforts.** HES staff expressed a desire to better understand where program collateral was disbursed, and to what extent specific pieces influenced customers to take action. Adding promotional codes to program collateral, asking callers to the Contact Center to identify where they heard about the program (and which promotional pieces they had), and placing a higher effort on monitoring collateral distribution and circulation could help provide feedback on this issue.

Areas of Exploration for Process Evaluation Research

- **Participant Surveys:**
  - Understand which participants used the web site – which pages they visited, and which pages they found most valuable – as well as what information participants wish had been available on the web.
  - Explore perceptions of differences with HER and Home Performance with ENERGY STAR, particularly among those who participated in one of these efforts.
  - Explore why some customers might not take actions recommended by HER. Based on our review of the current logic model, one important link is that customers are made aware of the program and energy saving opportunities and then take action
  - Explore satisfaction with the delay/timing of HER visits with customers who have requested them. (Note that we will also be exploring overall satisfaction with the program. This list only reflects the issues mentioned above.)
  - Notably, while not addressed above, the 2005-2006 HES evaluation report mentioned that Energy Trust should also "Further investigate what other information HER participants would like to receive during or after their audits." This may also be an area to consider in the 2009 participant survey effort specifically with HER participants.

- **General Population Surveys[2]:**
  - Examine statewide awareness of Energy Trust, the HES programs, and the specific program components including HER, incentives, trade ally lists, and special promotions. (NOTE: this issue is incorporated in the most recent draft of the General Population Survey, but could be expanded.)
  - Examine multi-family respondent interactions with trade allies since one key part of the program, based on the current logic model, is "trade allies promoting the program"
  - Explore perceptions of differences and potential marketing messages for HER and Home Performance with ENERGY STAR – optionally, this could be done through indepth interviews or focus groups.
- **Follow-up Interview with Marketing Staff:**
  - Opinion Dynamics will contact Energy Trust and CSG marketing staff to better understand the diffusion of marketing efforts across the state and how the effects of marketing efforts are tracked. (Note that this is one area we did not cover during our initial interviews.)
- **Other Possible Program Staff, Collaborator, and Trade Ally Follow-up:**
  - Explore differences with HER and Home Performance with ENERGY STAR.

Trade Allies

The HES program interacts with trade allies in a number of different ways – via incentive forms, training sessions, the Weatherization manual, HomeCheck, the Conservation Advisory Council, the Energy Trust website, marketing efforts, the Insider newsletter, and quarterly Round Table Trade Ally meetings, to name a few. For the final report the majority of our insights with trade allies will be drawn from the trade ally depth interviews and participant survey planned to take place in the next few weeks. However, our initial interviews touched on a few trade ally topics, and we briefly describe them below.

Based on our staff interviews, the strengths of the trainings for trade allies are two-fold: 1) they are set up to encourage high quality measure installations, and 2) they are designed to be responsive to the needs of the program and the market. We learned that the CSG Training Team places priority on developing courses that promise both high attendance and professional certification, since these are thought to lead to the greatest increases in quality measure installations.

From respondent comments (note that these were staff and collaborators, not trade allies), the training sessions appear to be responsive to the needs of the program and the market. Interviewees informed us that the Training Team responds to requests for future training

[2] The need for financing was also an issue mentioned in the trade ally survey, and may be something Energy Trust considers exploring in the General Population survey.

sessions from HES staff for areas where there are quality control problems or where "*contractors are falling short*." For example, if the manager of the Home Performance team reports that few incentives are in the long-term pipeline for duct sealing, the Training Team will organize duct sealing training sessions; or if a trade ally coordinator identifies problems with proper insulation installation, the Training Team will organize insulation trainings. Another source of new training course topics are evaluations. One person said: "*Once we get the evaluations in we basically feel that's the market speaking to us and telling us what to do next. So we weigh on those pretty heavily.*"

While the staff interactions with trade allies exhibit several strengths, our initial research indicates that the training process may be hindered by shifting program priorities. Areas for possible improvements with regard to trade allies and shifting program priorities include:

- **Ensuring Investments in the Development of Training Materials are Made Wisely:** It takes the Training Team approximately six months to develop new materials. Once a topic is identified, the Training Team researches the Oregon market, talks with trade allies, consults with government building departments and agencies, and incorporates technical content developed by CSG's Applied Building Science Department, based in New England. In the time that it takes to develop the course content, the HES program priorities can shift due to new realities in the market. This results in the team dedicating resources to revising old materials that could otherwise be spent creating new content. While some change is inevitable, anticipating change where possible, and communicating this to program staff can help streamline the process of getting trainings into the market.

- **Building Trust with Trade Allies Through Consistent Program Policies and Additional Communications:** There is a fear that trade allies perceive the HES program requirements as constantly in flux and not open to trade ally input. Instructors and training schedulers, who interact regularly with trade allies and act as "the face" of the HES program, feel as though they bear the brunt of the criticisms from frustrated trade allies. They feel that trade allies lose a little bit of trust in the program, and in its representatives, each time that a policy shifts in a way that is unexpected. In addition, based on our initial review of the 2009 Trade Ally Survey administered by Energy Trust, some trade allies are frustrated by the staff turnover within CSG, and are interested in being heard and helping provide insights on the market.

Other areas for possible improvement with regard to trade allies include:

- **Identifying the Preferred Methods for Communication with Trade Allies:** The HES program currently reaches out to trade allies in a variety of methods: email, hard copy letters, newsletters, quarterly meetings, web sites and more. However, staff are unsure about the ideal methods to use, how often they should be sent, what they should include, and whether the communiqués reach the correct recipients. Energy Trust's annual Trade Ally survey helps to answer some of these questions; our depth interviews will also gather additional research.

- **Addressing Distrust of HomeCheck:** Home Performance with ENERGY STAR trade allies are supposed to use an energy calculating program developed by CSG called HomeCheck. This software supplies the customer with a comprehensive cost and

savings report and it supplies Energy Trust with savings data. According to our interviews with program staff, contractors claim that HomeCheck is very hard to use and some have refused to use it. This refusal undermines the effectiveness of the services and the consistency between contractors.

CSG has worked to make improvements in the software to increase its user-friendliness. They released an updated version, and training on this version took place in February 2009. However, according to our interviews with internal HES staff, many contractors do not seem to be willing to try the new version. The contractors remain involved in the Home Performance program but are not using the software and, as a result, the jobs are not recorded correctly.

For accurate energy saving estimates and ensuring consistency across jobs, Energy Trust needs to ensure that trade allies uniformly use an energy calculation program. Other Home Performance programs address these issues by offering bi-weekly webinars or monthly training sessions on a HomeCheck-equivalent package to help contractors feel comfortable and identify and resolve issues as they arise. These options may be good options for us to explore through our in-depth interviews with trade allies.

- **Documenting Home Performance Contractor Partnering:** It can be rare for a single contractor to possess all of the skills necessary to complete all of the tasks required in a full Home Performance job; consequently partnering is common. In this case, Home Performance contractors coordinate with other non-Home Performance contractors and become responsible for any subcontractor's work as the general contractor. Currently, the HES program does not track these partnerships, and as a result, may be missing opportunities to identify, nudge, promote or incentivize coordination among Home Performance contractors with complementary skills that could further push the program's development. Other Home Performance programs track these partnerships, and promote them to ensure the highest level of expertise during a job and ultimately create a network of highly skilled contractors that work together and create mutually beneficial leads.

- **Improving Understanding of Home Performance with ENERGY STAR Trade Ally Requirements:** To become a Home Performance with ENERGY STAR contractor, Energy Trust requires the contractor to go through expensive training (12-14 days and over $1200 per person), purchase expensive diagnostic equipment and to change their business model to promote a more expensive, comprehensive treatment of the home. Some trade allies feel that they already offer the level of service of Home Performance, but do not want to pay for the Building Performance Institute (BPI) certification, because they view it to be redundant.

- **Providing Needed Training:** Interestingly, based on our initial review of some of the trade ally responses, trainings are seen as valuable, and contractors are asking for more trainings. There were requests for training sessions in outlying areas, for ETO to provide more notice of training sessions, and to provide more training materials.

Areas of Exploration for Process Evaluation Research

- **Trade Ally Interviews:** Opinion Dynamics Corporation plans to conduct depth interviews

with trade allies to explore some of the following issues:

- Perceptions of Energy Trust and the HES program, especially with regard to program requirements and the effects of shifting policies.
- Value and level (e.g., is it providing enough technical information) of the information provided in the trainings. Frequency of training sessions, availability of training, and types of available training to assist with HES.
- Preferred methods of communication, their frequency, and topics.
- Experiences with HomeCheck, both good and bad, and their exposure to other energy programs.
- Frequency and satisfaction of partner relationships of trade allies under the Home Performance program,
- Incorporation of energy products and services as standard business practices. (Note that the current logic model assumes that this link is occurring, and is an important link to test to determine impacts of the program.)

- **Secondary Research:**
  - Review other Home Performance with ENERGY STAR programs to identify:
    - The pros and cons of alternative programs to HomeCheck.
    - How other programs document partnering among Home Performance contractors.

Collaborators

Energy Trust coordinates and partners with several utilities, governments, and quasi-government organizations in Oregon and the Pacific Northwest on numerous energy efficiency programs and initiatives. We interviewed representatives from seven of these organizations to gauge the strength and frequency of communication between the HES program and these "collaborators."

Coordination with Energy Trust varied by organization and included efforts such as co-branding of marketing materials, call/contact center lead generation, and participation in Energy Trust pilots and programs. Some of the collaborators indicate that the level of communication and collaboration with Energy Trust is good across most programs, including the HES program. However, a few collaborators feel that while there are individual success stories, there *"could be a lot better relationship."*

Some possible areas of improvement between the HES staff and collaborators include:

- **Improving Communication with Collaborators**: Although some organizations said that they feel the extent of communication with Energy Trust is appropriate for their level of interaction, other collaborator respondents indicate that improvements in coordination and communications are desired. One-on-one communications with Energy Trust program managers and the program managers at other entities is desired. It is felt that communication should not be left with one or two "designated" individuals at each

organization, but rather should be between the parties actually marketing and running the programs.

In interviews we also heard that although there may continue to be a role for "all-party" meetings, it is felt by some that these are not the right venues - due to proprietary data concerns and difficulty in getting ideas out on the table - to share marketing plans among different collaborators.

Furthermore, collaborators expressed concern that when they had problems or wanted to see changes made to the program, they were often referred to the implementation contractor rather than Energy Trust staff. While contractors could sometimes solve their problems, there were other cases where they felt that the contractors did not address their concerns. Respondents felt that since the contractors did not report to them, they sometimes had little incentive to make changes and resolve their issues.

- **Encouraging Collaboration**: Collaborators desire more coordination and communication improvements in the following areas:
    - Program design - increase collaboration on the list of measures and incentives being promoted in their territories
    - Contractor training and retention
    - Program status updates and changes in scope and direction
    - Marketing efforts[3]

  Utilities also requested more lead time to add HES program(s) into their own marketing calendars as they plan and book marketing 6 to 12 months in advance.

  Another concern raised during the interviews is that the HES program seems to promote programs prematurely before all details are fully thought through, resulting in a great deal of difficulty at utilities that have to field all the program launch customer calls and complaints. For example, as one respondent stated, when a program is rolled out to promote a product–programmable thermostats, hot water heaters, efficient clothes washers, etc.- but there is not enough product on the shelves to meet demand, customers call the utility complaining and asking where they can get the products, etc.

- **Addressing Confusion over Various Incentive Levels and Federal Tax Credits**: Some collaborators expressed concern with Energy Trust's incentive levels and possible overlap with their own programs. Different incentive levels across the gas and electric utilities and Energy Trust can confuse customers and force them to "call around" trying to find the best deal. There may be a need for Energy Trust and the collaborators to communicate more regularly to minimize potential overlap of offerings by the various parties. In interviews we heard that there is overlap between offerings and the challenge is to determine responsibilities and minimize current and future duplication of efforts.

  According to our interviews, there may also be a problem with trade allies and vendors promoting both HES rebates and Oregon tax credits to the same customers, regardless of whether the customers qualify for both programs. When this happens, some

[3] We note that co-branding can work, but not if the customer is confused about who is doing what and where to go for information.

consumers could be falsely led to believe that they can obtain both types of incentives. This leads to consumer dissatisfaction and distrust of all involved parties, and frustrated collaborator contact center personnel who must field angry calls.

- **Providing Better Information by Linking Utility and Energy Trust Websites**: One respondent suggested that all parties ensure that their web sites provide customers access to each other's sites. For example, a customer signing in to one utility's web site could click on a link to find out more about Energy Trust's programs and offerings.
- **Improving Coordination between the HES Contact Center and the Utility Call Centers to Ensure No One Falls Through the Cracks**: Some interviewees indicated that there should be more coordination between Energy Trust and utility contact/call centers because they feel that the current arrangements occasionally drops callers who do not neatly fit into pre-defined categories. Based on interviews, contact/call center staff on both sides need to be better trained to know when and how to forward questions to the appropriate organization.

Areas of Exploration for Process Evaluation Research

- Participant Surveys
  - Explore overlap, awareness, and "confusion" over various program benefits, incentive rates and tax breaks
  - Explore issues around pre-mature launch to determine the extent of this issue, versus some solutions/recommendations.
    - Ask if customers had difficulty in obtaining a product or service offering.
- General Population Surveys
  - Explore awareness and "confusion" over various incentive rates.
- Program Staff and Collaborator Follow-up:
  - Explore issues around pre-mature launch to determine the extent of this issue, versus some solutions/recommendations.
  - Work with Energy Trust to develop a short survey to explore collaborator's preferences for communications.
- Web Site Review:
  - One option for additional research includes reviewing Energy Trust web site and collaborator websites to identify pages for cross-linking.

Internal Communications

There are numerous internal program efforts, and both CSG and Energy Trust have large staffs of people involved in this effort. Based on the depth interviews, the relationship between the Energy Trust team and CSG has continued to improve, and the two groups are constantly striving to improve program processes. Staff from Energy Trust and CSG meet frequently to facilitate communications. Moreover, due to recent hires within CSG, and the

reorganization of some of the roles within Energy Trust staff, internal communications are getting better. However, many of the program staff (both Energy Trust and CSG) acknowledged that there are still improvements that need to be made internally. One specific area frequently mentioned was the marketing process and marketing review cycle. Many of these problems related to marketing efforts appear to stem from more fundamental problems with internal communications.

Based on our depth interviews, some areas for consideration include:

- **Better Defining the Roles of Each Group (specifically, groups within Energy Trust and groups within CSG):** There appears to be a significant amount of overlap in efforts between Energy Trust and CSG. For example, when asking individuals about the roles of the staff within each organization's marketing teams, there appear to be two groups that develop marketing collateral, two groups that "design" materials, and multiple groups that coordinate with trade allies and collaborators. One example of duplication occurred with the initiation of two parallel-path pilot efforts for Heat Pumps. The efforts were started by two different groups who were unaware of the other effort, and who only became aware of the other's efforts when they got to the point of developing marketing materials. Better defining roles will help streamline the process. (Note that this example is also tied to the next possible area for improvement.)

- **Developing a Better Project "Start Up" Process**: Within the HES program, there are several pilot efforts, communication materials, and other initiatives that attempt to expand participation and look for additional ways to get energy savings. Our initial interviews indicate that there is need for a more formal (and collaborative) process to initiate new efforts or changes in the program. Some progress has been made in this area: specifically, the marketing teams have developed a "job start" form for starting a marketing piece.[4] However, based on our interviews with CSG and Energy Trust, there appears to be a need for a start up process that is initiated at the start of a program effort, such as a pilot effort, rather than just when a marketing piece is needed. Specifically, there is a need for a kick-off meeting (or for a smaller effort, perhaps a memo) to formalize the effort and document the effect of the effort on each of the groups within HES. In addition, a tool similar to the marketing job start tool that includes a table that asks the initiator of the effort to think through the effects on various groups (i.e., pilots, marketing, trade allies, utility contacts, other collaborators) could help eliminate some of the recurring challenges upfront. Finally, the monthly meeting and/or monthly report may be an appropriate place to ensure that all parties are aware of new initiatives (see Monthly Reporting section below).

- **Creating a More Collaborative Process between the Program Staff and the Marketing Staff within CSG (and facilitating the marketing review process):** In delivering HES, field staff bring technical expertise to the program, while the marketing team has expertise that is crucial to delivering messages to customers. Bringing these two groups together is important (especially in developing marketing materials). Program staff, however, are (understandably) difficult to contact since many are in the field, and marketing staff is

[4] The goal of this effort is to clarify the target audience and objective of the marketing piece so that the marketing pieces are thought out prior to getting to Energy Trust's marketing team.

often busy juggling multiple efforts. Through depth interviews, it appears that the most effective work between these two groups occurs when they are able to sit down and work together on the language about how the materials should be worded. Working together at the start could eliminate miscommunication about the messages and multiple iterations of wording and re-wording. The marketing staff could facilitate these efforts, attempting to work with the technical staff to help them develop language that will be effective in a marketing piece. Notably, finding time to bring a member of each group together may be challenging, but the challenge would be well worth the effort if it eliminates some of the delays and headache experienced in earlier efforts. This effort should help facilitate the marketing review process. Other suggestions for facilitating the marketing review process that were mentioned during our interviews include:

- **Ensuring that the Targets and Goals of Each Marketing Piece are Explicitly Laid Out:** As mentioned above, marketing has recently initiated a "job start" process for each marketing piece. This is a form that is intended to help ensure that the targets and goals for each marketing piece are explicitly laid out prior to initiating the marketing effort. This is an important effort that will help facilitate the creation of new marketing pieces.
- **Shortening the Review Cycle:** While the suggestions above will help facilitate the marketing review process, the program may also want to directly address the marketing review cycle by shortening the timeframe and the number of reviewers. Energy Trust is regarded as being unable to provide a quick review for several reasons, primarily (1) an overload of work and (2) the fact that rather than having reviewers who are empowered to review one piece well for multiple end-goals (e.g., copy-editing, branding, target) they rely on multiple internal reviewers. For smaller items (such as one-page letters), specifically ones that have been reviewed by the Energy Trust marketing team at least once, have a shortened review cycle and one designated reviewer from Energy Trust. Energy Trust may also want try to train HES staff (through internal discussions or external trainings) to be able to understand all of the needs of the marketing materials so that only one or two reviewers are needed.

- **Creating a More Pro-Active Marketing Effort:** According to interviews the majority of the marketing collateral is created by the HES program team, filtered through the CSG marketing team, and then sent to Energy Trust. The process within the marketing teams becomes reactive (rather than pro-active) and the timing is driven by "the project start date" rather than by a marketing plan. As a result of this reactionary process, some pieces may not be needed—or at least not as needed as other marketing efforts. The program does have a marketing plan; however, it appears to be broader than just the HES program (including solar and new homes, which can be good). The plan itself, however, does not appear to be actionable since it is not explicit in who is initiating the marketing efforts, or what roles they play. While good in the sense that it gives an overarching picture of the target markets and the goals, the program may wish to develop a more pro-active approach in some areas. This will also enable the program to work more effectively with utilities and other collaborators. (See collaborator write-up for more information.)

Areas of Exploration for Process Evaluation Research

- **Observe Internal HES Program Meeting:** Opinion Dynamics will work with Energy Trust to attend (via conference call) the next internal Program Meeting to get a better sense of which issues might be most pressing.
- **Develop Organizational Maps (including follow-up interviews, as necessary):** Program staff indicated that there is an organizational chart available within the program manual, but the evaluation team has not been able to locate it. Opinion Dynamics will work with Energy Trust to gather information that is available, and provide a complementing network map that indicates "areas of development" for the future. Opinion Dynamics will also conduct follow-up interviews as necessary.
- **Review Energy Trust's 2002 Report on Organization Best-Practices and/or Interviews with Organizations in Role Similar to Energy Trust:** Energy Trust has conducted prior research about best practices in organizational and internal communications and Opinion Dynamics will review this research to see if there are areas where Energy Trust is diverging from their intended structure based on the best practices research. If these areas were not discussed in the best practices report, Opinion Dynamics will discuss the possibility of adding interviews with other organizations to our evaluation scope of work.
- **Follow up Interviews with Technical Field Staff and Marketing:** As an option, Energy Trust may want the evaluation team to explore and identify new communication avenues and practices to assist with internal communications.

Program Databases and Monthly Reporting

The HES program uses two databases, Goldmine and FastTrack, to manage customer information, count installations, calculate energy savings, and track and manage incentive applications and payments.

Goldmine is the relational customer database and the Contact Center uses it to track every call and incentive application form that comes in. Energy Trust and CSG staff use it to catalogue complaints from customers and contractor, and the results of marketing efforts.

FastTrack is used to monitor program goals and verify and manage incentive payments. Most staff use FastTrack on a daily basis to look up specific records.

In addition to the databases, by the tenth of each month CSG submits to Energy Trust a monthly report that records the program's progress and activities and includes sections on goals and forecasting and detailed department-by-department updates. The reports grew incrementally lengthier over time: In early 2007 the monthly reports were around 30 pages in length, and at the end of 2008, they were well over 60 pages in length. One interviewee called these reports the program's "historical record."

Some potential areas for improvement for the program databases and monthly reporting practices include:

- **Ensuring that FastTrack Meets Program Needs**: HES staff do not trust the accuracy of reports generated by FastTrack. Numbers of measures installed or processed are close, but do not often match up between reports generated by different people. An Energy

Trust interviewee said:

> *"I still remain skeptical about reporting…. You don't know where it's pulling from and what it's doing and so often the data that we get … doesn't match up."*

Another respondent said that there are numbers that *"don't make sense because there's a lot of double counting"* from how numbers are presented in FastTrack reports, though not through malicious intent. The interviewee provided two examples: 1) measures can be split across payments and therefore they can be inadvertently double or triple counted. 2) When measures are installed though the Home Performance program, they may be counted in Fast Track under the Home Performance umbrella, and also under the HES individual measure (for example, wall insulation). Depending on how the data is queried, these jobs may be counted twice.

Additionally, in our interviews, we heard that only a few staff possess the capability to create ad hoc reports in it. Interviews with HES staff indicate that Energy Trust should strengthen staff capacity and technological capability to create ad hoc reports from the databases. Greater ability to do ad hoc reports would enhance staff ability to spot trends and effectively communicate with trade allies and other key organizations.

- **Ensuring that Goldmine Still Provides Value to the Program**: Staff complain that Goldmine is old, difficult to use, and challenging to pull information from; many staff outside the Contact Center use it grudgingly, and only when pressed. Revisiting the time spend maintaining Goldmine, and the value of this database, may be of interest to the program.

- **Ensuring that Reporting is Efficient and Effective**: The monthly report contains a lot of valuable and detailed information. The effort and resources invested in creating the report, however, is significant and likely excessive. Based on our interviews, it appears to take approximately one full working day to prepare each section, and one interviewee called it *"a tremendous undertaking."* Few staff at Energy Trust and CSG read the monthly report in full, stating that they are too pressed for time. Interviewees indicated they skim sections that are most relevant to their work, check it when they have questions about what is going on in another department, and refer to old reports when they need to remind themselves of specific dates, activities, or goals. Those that do read it in full commonly said: *"there's a lot of good information in there."*

  While the monthly report demonstrates value as a historical record and a vehicle for inter-departmental coordination, it could be enhanced by changes such as highlighting new initiatives and bringing together information more succinctly and effectively.

Areas of Exploration for Process Evaluation Research

- **Clarify Purpose of Monthly Reports.** Because the monthly reporting appears to take away from actual program time, we think that looking further into the purposes and uses of the reports would be beneficial. We plan to conduct a follow up interview with Diane Ferington, manager of the HES program, and other key individuals to learn how they use the monthly reports, find out if Energy Trust needs to receive all of the information included in the monthly reports, which sections they find most valuable, and reasons why they are growing longer. Our interviews will allow us to learn who the audience is for the

monthly reports and the reports' ultimate purpose to determine if the content can be reduced.

- **Database issues:** Because we know of other evaluations that are looking specifically at the database issues, we have no plans to explore this issue further here, but we feel that this is an area in need of exploration by the program because it can help eliminate confusion and streamline efforts.

Application Forms and Program Requirements

The overarching message from the 2005-2006 evaluation (published in July 2008) was the application process needs to be streamlined.

According to an interview, in the last full-year, 2008, over 18,000 incentive forms were submitted for the HES program. Of these, 99% arrived via standard mail with a paper copy of Form 300A; the remaining 1% arrived by fax. Another HES staff person estimated that at the end of 2008, 60% of the forms were completed by the homeowner, and the remaining 40% were more likely to be completed by trade allies or contractors; smaller trade allies and contractors were less likely to complete the forms and send them in. [5]

One strength of the current process is that CSG and Energy Trust have a well-understood, detailed, multi-step process for handling the incentive application forms and disbursing incentives. However, some areas in need of consideration include:

- **Streamlining the Application Process and Eliminating Incomplete Information:** in the interviews Energy Trust and CSG managers highlighted several issues around streamlining incentives including converting to web-based forms, removing the need to submit multiple applications, and eliminating issues around the termination of Home Performance incentives.
    - **Converting to Web-Based Forms:** Staff expressed a long-held wish to convert the paper-based incentive application form to MS Word- or web- based to minimize staff effort for data entry and quality control, and reduce the number of incomplete forms. Incredibly, 50-75% of incentive forms are missing at least some information each month.6 The interviewees specified that any new incentive form system would have to be secure from tampering and identity theft, and feature a method for receiving receipts or other sort of proof of purchase, either via snail mail or via PDF. Therefore any new incentive form system would not be fully free of the conventional mail system, and additional staff time would be necessary to link the electronically-submitted information to the conventionally-submitted receipts. In addition, participants would experience an extra submittal step (step one: complete electronic form; step two: mail or scan in

[5] In our interviews, we also heard from one respondent that the Contact Center prefers forms that were completed by the homeowners instead of contractors because homeowners are more likely to spell their names correctly.

[6] As of the close of 2008 non-residential (non Home Energy Solutions) incentive programs for efficient refrigerators, freezers and clothes washers at Energy Trust use an online incentive application form.

receipt). That said, requiring fields to be filled out before accepting the submission online could also help eliminate incomplete information.

- **Removing the Need for Submitting Multiple Applications**: For Home Performance with ENERGY STAR jobs, which often involve incentives for multiple measures, there are duplicative efforts for most of the items required on the incentive forms. Moreover, the incentive forms can require coordination between several contractors to ensure that all are submitted.
- **Eliminating Issues Around Termination of Home Performance Incentives**. During the trade ally's first year, the Home Performance with ENERGY STAR program provides incentives to jump start the contractor's new opportunities. These incentives include support for training and incentives for production. By incentivizing elements of the first year of participation, Energy Trust believes that the contractor will focus on the Home Performance with ENERGY STAR projects, see value in the model and ultimately earn referrals from satisfied customers. Initial incentives are needed because the Home Performance program requires the contractor to go through extensive training, purchase expensive diagnostic equipment and change their business model to promote a more expensive, comprehensive treatment of the home that is harder to sell. Staff report that current Home Performance contractors get upset when incentives end after one year in the program.

Notably, based on our initial review of data collected through the Energy Trust trade ally survey, trade allies also mention the need for easier forms, as well as "processing paperwork and cutting checks faster."

Areas of Exploration for Process Evaluation Research

- **Participant Interviews:**
  - Explore difficulties with forms.
  - Explore value of online applications.
- **General Population Surveys and Participant Surveys**
  - Explore value of online applications.
- **Interviews with Organizations in Role Similar to Energy Trust:** Explore how other organizations overcame the process of converting from hard-copy to online application forms.
- **Trade Ally Interviews:**
  - Difficulties with forms
  - Handling HES requests to address 'missing information'
  - Differences between larger and smaller trade allies
  - Issues around removing benefits for Home Performance trade allies one year into

the program

Appendix B. Market Assessment Memo

Assessment of Five Markets

Below we describe the market-specific findings related to the effects of the Home Energy Solution incentives. Specifically, trade allies (28 in total) reviewed and provided comments on the market assessments developed in early 2009 through Energy Trust's 2009 Trade Ally Survey (see attachments); they also provided insights on the value of the program, as well as recommendations about changes in incentives or products that should be considered for the future. We also pulled in information on free ridership to demonstrate the role of the program in the marketplace.

The five market segments discussed below include:

- Gas furnaces
- Heat pumps
- Duct sealing
- Insulation, and
- Windows.

Note that a future write-up will provide programmatic findings from the trade ally surveys.

Gas Furnaces[1]

Based on our findings, the gas furnace incentive is valuable in this market. Specifically, in addition to the small monetary value, trade allies believe that the Energy Trust rebate provides a non-monetary benefit of validating (or reinforcing) the contractor's claims that the efficient unit is worth the initial investment. Trade allies also believe that the incentives increase demand for high efficiency products, however, there is some evidence that the financial incentives might only be needed for furnaces that are at least 95% efficient.

Comments on Energy Trust's Market Assessment

When we asked trade allies to comment on Energy Trust's assessment of the market, they seemed to generally agree with the estimates; however there were several comments that would indicate that the percentage of gas furnaces 90% or more efficient may be larger than stated in Energy Trust's 2009 assessment:

> *Now I don't break them down [gas furnaces] by over 95% but from 90 to up pretty much our percentages would differ considerably…Yeah we just had a meeting this morning and we were going over what we've installed year to date as opposed to last year to date you know the same period and I was looking at the gas furnaces, we installed 28 90% and we installed only five 80%. And I don't have a breakdown over the 95 what that would actually be and that's on one side. We operate under a couple of different names so we can sell different brands. So you could up that. And on the carrier side we only did, there were absolutely no 80% put in it was 90% and actually 90% infinity*

[1] This section draws on five trade ally interviews. All contractors had been trade allies for more than 5 years. In 2008 they installed from three to over 200 gas furnaces. Please note that one of these contractors does very little work in Oregon as he is based in Vancouver, Washington.

which means they would have all had the ECM's and user interface modules…They estimate for 90% or more at 63, 64 our would be more like 90%. And the 95 or greater that might hold true. We do very little 80%.

Two trade allies said they always recommend energy efficient products and services, and two others seem to for the most part, but will consider lower efficiency at the customer's request:

…if the customer wants anything less than that then I will entertain that but I never offer anything less than 90%.

Furthermore, another trade ally made a comment about new homes, which indicates that high efficient furnaces are prevalent in the marketplace and that contractors will have experience installing 90% or more efficient furnaces (although the comment was specifically about new, not existing homes).

Effect on Gas Furnace Market

Overall, trade allies that deal with gas furnaces say the program and the incentives are very influential in the market. The program has changed what is currently being installed. In addition, the incentives are viewed as valuable not just because of the rebate but because of the validation it provides, among other reasons. Comments from three contractors include:

It makes people more likely to up it, you know, go from an 80 to a 90…[Also] the fact that an entity that isn't us is saying that we're giving this much money back in order to save energy so they know there's an independent determination here that these things are more inherently valuable because they're giving money back for you to do it. And I think it serves to reinforce their desire to do it by-everybody likes to get some money back and then they also like the fact that they are you know using less energy, being more green and that the Energy Trust of Oregon says they're doing a good thing and we're going to give you some money back.

I think it's having a great effect really. Especially – you know I think it's been a little harder for people in the economy here the last couple of years and those people that would really be focusing on a lower efficient model just to save a few hundred dollars are justifying it because there are incentives available to them…I do believe that it does reinforce their decision to upgrade to higher efficient equipment with the credits that are available through the Energy Trust as well as these tax credits and other incentives that are offered.

I think it helps it…The public has been fed this rebate idea for so long that whenever anybody buys anything they expect that there's going to be a rebate.

Several trade allies also indicated that there is value in the incentives for gas furnaces because the cost differential is large—greater than $1,000:

I think that the price difference between the equipment, the 80% equipment and the higher efficient gas furnaces is off. I believe on an average for the type of equipment that we sell, which is very good quality brand, that the cost difference is a little bit greater than $1,000.

We asked the trade allies whether the market would change in the absence of Energy Trust of Oregon's gas furnace incentives, and the trade allies felt that it would:

You'd see people less willing to do a 90% furnace.

They would buy less efficient products.

That rebate is the big thing to the consumer.

You know I think people would revert back to putting in a lower efficient model. At this point like I was saying the knowledge of the incentive program out there has certainly spurred things. I just feel very strongly that without some of these incentives that are available we would certainly have a decrease in the efficiency of the equipment that we are installing. I have no doubts about that.

In fact, one trade ally said that the reduction of the incentive to the $100 amount "*has reduced the sales of higher efficiency products*." Another said that "*…some of the decreases in the incentives…certainly have had customers taking a second look to see whether or not it's worth doing the upgrades for them…"*

Support from Net to Gross Findings

Our calculations from the single family participant survey also indicate that Energy Trust is having an effect on the market, but that several of the high efficiency installations would have occurred in the absence of the program. The Home Energy Solutions Program is responsible for 42% of the energy savings from gas furnaces rebated (note that this does not include spillover from participants who received rebates for other items). This number seems a bit low for the influence that trade allies are attributing to the incentive, but the incentive seems to have a role to play in moving participants up the ladder of efficiency.

Recommendations from Trade Allies

The trade allies had a few suggestions for making changes to the incentive levels, mainly incenting at 95% efficiency. Three comments included:

I think there ought to be better incentive to go above 95% efficiency on the burner, especially if there's a ECM motor involved. There's a $100 period for any burner efficiency no many how many stages, no matter what [inaudible 23:37] motor of $100. So there's definitely a couple stages more of efficiency above that that could be incented for… That $100 really isn't much. There again, if we were to jump up to the 95% or better, there should be an incentive for taking the highest efficiency on the market. [Inaudible 24:19] high efficiency fan motor the state gives a $350 tax credit [inaudible 24:25]

ECM fan motor. But there is no benefit to go to the ECM fan motor from the Trust. It's like they don't care about that.

I mean I keep-I'd still keep the standard 90% but I wouldn't give-I'd give it a lesser rebate and then 95% I'd give a greater rebate or more incentive to go to the higher efficiency.

They could make them like equal to the Federal standards.

One trade ally also had a suggestion for products or services that should have Energy Trust rebates:

Yeah I think it's really-the major thing down here that I would say they need to offer an incentive for is instead of just going in and sealing the duct system I think they should offer an incentive to the homeowner if they choose to put in a 90% gas furnace and you know they've had some other source of heat and at this point unless you can do a pretest they can't-they can get a tax credit but they can't get anything through the Energy Trust or the Home Energy Solutions for a new duct system unless you're just ripping out the old-I mean you know if it's a full, what we call a full cut job where we're actually putting in everything from scratch there's nothing on the ETO side for duct systems.

Notably, one of the contractors mentioned some of the reasons why they sometimes do not install high efficiency furnaces. Energy Trust should consider these barriers to installing as they try to increase the efficiency of this market:

…I mean it kind of depends upon the homeowner, sometimes I will-I mean if it's you know something they're just fixing up the house to sell sometimes I might say well you can do this and it's going to be cheaper than that and you know you don't have any-this is enough to get the home inspector to you know say it's ok and that kind of thing. Other than that we pretty much would across the board offer-up there you know except if it's a little old lady and she's got a $60 heating bill in a little house and she's got you know an 80% furnace, there would be times where I might tell her you know if you go to a 90% furnace you're actually going to save about $5 so I don't want you to have any illusions about that, this isn't going to make this drastic in a little small house that has minimal you know heating bills anyway.

Heat Pump[2]

While trade allies noted both the monetary and non-monetary benefits of the heat pump incentives, several trade allies expressed concern that the heat pump efficiency requirements are too high, making the incentive not worth it to the customer in the current economic time.

[2] This section draws primarily on five trade ally interviews on the heat pump market. These contractors have been trade allies from 2 years to the beginning of the program and in 2008 installed three to 30 plus heat pumps.

Comments on Energy Trust's Market Assessment

Three trade allies who had a chance to look at the heat pump market assessment agreed with it for the most part; although one mentioned that he had slightly more efficient sales numbers.

> *…where it says 9.5 or better put a 25% in there for me, 25% on the 9 to 9.4 and put 75 or 50% or so on the 8.5 to 8.9.*

In general, however, the participating trade allies that we spoke with mentioned that they offer energy efficient products, except in some cases in manufactured homes.

Effect on the Heat Pump Market

Interestingly, while the incentives are viewed as valuable, most of the contractors said the market would not change much at all if the incentives were removed, but contractors noted that this is partially because of the recent decrease in incentive levels. In their opinion, the incentive is not enough to get customers to the highest efficiency.[3] Three trade allies expressed concern that the current incentives required efficiencies that were too high, making the incentive not worth it.

> *There wouldn't be too much of a change [without the incentives]… because there aren't very many people that we're serving that are getting it right now.*

As mentioned above, however, several of these same contractors state that Energy Trust's incentive is very important for those who can be moved to the higher efficiency level:

> *[The incentives] definitely give a reason to step up from a mediocre unit to a high performance unit…it's definitely increased the number of heat pumps that we sell…I think the consumer is more educated too on the awareness of heat pumps and their efficiency.*

> *Oh I think they're substantially effective. The customers consider them extremely important because they perceive a rebate and a tax credit on an energy efficient system a positive so they're extremely important.*

> *I think that when you broadband the way the economy is right now and the need to reduce your budget on how you shop and all that I think that it's critical for making efficient decisions when you get down to the individual kitchen table. I think it's critical that these rebates are out there because a lot of good decisions are being made because they are being funded. Like cash for clunkers. I would say that probably 85% of the decisions made on picking an energy efficient system is based on having some outsourcing on the funding, having some help. Probably 85% and that's probably pretty accurate. I've been doing this forever.*

> *You know the extra money helps offset some of the extra costs, the added costs to the higher efficiency units.*

One contractor noted, however, that the incentives don't do much:

[3] One trade ally, however, said the market would change a lot without the incentive.

> *I would say that only a small percentage of [customers] really, really base their decision on [the incentive]. Most people base it on cost…To a small percentage of people, they're very important. To most of the rest of the population, they're not.*

Contractors also offered additional comments on the more stringent requirements for heat pump incentives. One noted that the percentage of jobs they do as an Energy Trust trade ally has "*probably decreased because the incentive requirements went up so much*."[4] Others also mentioned how the recent change in requirements has affected the market:

> *I would say last year [the incentives affected the market] a lot. It took very little bit to raise the efficiency of what they were buying and didn't take very much money, but now that it's higher, [customers] opt out.*
>
> *Well now that there's been a change in [the requirements] I would say not as much as before, before the rise in the efficiencies but there's - you know they do weigh in somewhat for some people.*

Support from Net to Gross Numbers

Our calculations from the single family participant survey indicate that Energy Trust is responsible for 37% of the energy savings from heat pumps rebated through the Energy Trust program (note that this does not include spillover from participants who received rebates for other items). However, these participants fell under the old incentive levels and requirements, and therefore cannot be directly compared to the input given by the trade allies. Most trade allies felt the market would not change much without the incentive, especially because of the recent decrease in incentive levels. Three allies also noted that the current efficiency requirements were too high for the incentive. This could indicate that free ridership would be even higher under the new incentive levels; however in order to know this, 2009 participants will have to be interviewed.

Recommendations From Trade Allies

Several contractors (including one interviewed for ducts) thought that the heat pump efficiency requirements were too stringent (and no longer always cost effective) and Energy Trust should consider decreasing the requirements:

> *As they are now, they don't really reach enough people. It's just too difficult to meet the heat pump requirements.*
>
> *Well like I said and stated before, I think they're a little bit high now that they've made changes and the amount of money that it takes to reach those efficiencies as opposed to-the money that you're getting back for having to get those high efficiency units doesn't always make it economically feasible.*
>
> *My only concern typically is as they want to continue to raise the efficiency bar for equipment that in turn raises the cost to the consumers. So it's*

[4] On May 1, 2009, Energy Trust changed the heat pump incentive to require an HSPF of 9 or more for heat pumps under 5 tons.

difficult from the aspect that at some point the benefit of going to such an extreme level in order to qualify can sometime outweigh the return on the investment.

Like I said I think heat pump is unrealistic and the furnace is kind of tunnel focused a little bit. You know the big incentives have more to do with the overall efficiency and the special motor requirements but yeah in short they should take a closer look at the air conditioning side and heat pumps because people aren't willing to pay in Oregon what you need to meet the high end equipment requirement. It doesn't pencil out mathematically it wouldn't make sense. So therefore the salesmen aren't….

In addition, one contractor expressed concern that existing homes were not getting the right level of attention from the program:

I guess I would wish that more of the budget was for preexisting houses and I think that based on the vintage of the house it could increase the incentive to making it more energy compliant. And the last thing I would do was spend 60% of my budget on a new construction house that's already too tight anyway. So I think that there is reverse logic on the priorities of what houses need to be addressed with your marketing dollars or your budget dollars. New construction doesn't need it as much as a 1940's vintage house. So whoever was involved with that part of the decision-making process was kind of out to lunch that day.

Only one trade ally mentioned another product, ductless split systems, that should be considered for rebates:

I think they've got the line drawn at a pretty good place for the most part. I think they ought to do more for ductless spilt systems.

Notably, contractors mentioned some of the types of homes where they sometimes do not install high efficiency heat pumps. These included rentals, low-income housing (*"where they just financially can't afford it* and manufactured homes *(where you would need to do a complete you know furnace and heat pump change out in order to reach those efficiency levels.* Finally, one contractor stated that:

The only situation I don't is for what they call the check-me certification for the heat pump program for the state tax credits but that may be more through the Department of Energy than necessarily the Energy Trust, although I do think they work somewhat hand-in-hand on this. That's the only service we do not recommend to the customers.

Duct Sealing[5]

Energy Trusts duct sealing incentive has increased overall awareness of this service, so removing the incentive would likely have a large impact on the market; however, according to trade allies, decreasing the incentive may or may not have a big impact. Altering the level or structure of the incentive may be effective without shrinking the market.

Comments on Energy Trust's Market Assessment

One trade ally agreed with the market assessment, and the others did not address it directly. In general, however, they felt that there is a lot of opportunity in the market if awareness can be raised:

> *Yes, again it's like your market study, I think there's a ton of opportunity, statistically three out of four homes need a duct sealing or a test at least*

Effect on the Duct Sealing Market

The trade allies believe that Energy Trust of Oregon's duct sealing incentive really drives the market. Taking away the incentive would likely decrease the number of duct sealing jobs done, as many would not even know about that option otherwise:

> *I think it's vital. It's, duct sealing is not a glamorous, you know, service to have. It's not like putting up solar panels, where everybody thinks you're the coolest kid on the block. And really many, many homeowners don't even know what a duct is, so to have the incentive there to help customers make that decision and to help them see it as, you know, worthwhile, worth their money, it's absolutely vital. I think it would be, you know, maybe 1% of duct sealing would happen without those incentives.*
>
> *Well I didn't know, well it probably heightens the need for it. I don't think that was really a concern prior to it.*
>
> *It is having-getting more people to do duct sealing but the incentives are also driving the price up for duct sealing to the homeowners…*[It is important] *75% of the time.*
>
> *I'd say very important.*

The trade allies feel that if you took away the incentive, the number of jobs would likely go down:

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[5] We conducted four interviews with a focus on duct sealing and insulation. These contractors have been trade allies from one year to the time Energy Trust "came into formation." In 2008 they performed from four to over 700 duct related jobs as an Energy Trust trade ally. Please note that one contractor no longer does duct work through Energy Trust because he does not meet new certification requirements (but he does still do insulation).

It would be virtually non-existent, except as it's required for things like duct insulation, but it would not exist as a stand alone industry.

I'm sure there would be less participants, but there are a lot of participants that aren't aware of it, so they seem surprised when I mention it.

The trade allies felt they had been affected by changes in incentive levels in various ways. One mentioned that the recent change was a huge hit to the company:

I mean the way that duct sealers work there's actually a pretty wide variety of the way the companies work and for some companies the change in incentives didn't make a difference at all… I mean it just changed the way they did paperwork and then for other companies, like us, it was a massive change…Yes. The most recent incentive change, I think, is going to cause us to do quite a bit less business in the energy trust territory. I think that we're going to have to downsize our workforce and work more in the rural areas, especially on mobile homes, so, yeah, I mean some of our guys are going to lose their jobs.

But a third said the recent decrease in incentive level did not change the number of jobs:

A good way, the incentives went up, the number of jobs went up a couple of years ago and then a number of jobs when the incentives went down didn't go down any so I think they did a good job.

Overall, trade allies also report varying levels of effects on their business as a result of the recent incentive changes.

Support from Net to Gross Findings

Our calculations from the single family participant survey indicate that Energy Trust is responsible for 69% of the energy savings from duct work rebated through the Energy Trust program (note that this does not include spillover from participants who received rebates for other items). Again, this fits in with the trade ally belief that the rebates really drive the market. This is the highest net of free ridership number among the five measures, and also the rebate that trade allies seemed to feel most strongly about.

Recommendations from Trade Allies

The number of recommendations about the duct market were limited, but trade allies have mixed opinions on what should be done about the incentive levels, with one suggesting the same level but better marketing, one suggesting a higher incentive, and one suggested moving to improvement-based incentives:

I think they're at pretty good levels right now… higher incentives get more jobs but that's not necessarily the best thing to do in my mind. I think higher incentives, better marketing on specific measures like duct sealing and air sealing to the customers.

I think that they should not be cost based but improvement based… Again, I think that, and this is just a general philosophy of mine on incentives, whether it be cash or tax rebates, I don't think that they should be cost based, because if you provide an incentive based on percentage of cost of an installation, then you are not passing along innovation to the market, to the homeowner, the homeowner doesn't see the benefit of any efforts that a company makes to decrease price or they see a percentage of it, not, you know, not 100%, whereas if there was a cash incentive based on the amount of energy saved, then any reduction in price goes straight to the homeowner.

One contractor suggested that cleaning duct systems and furnaces should be recognized by Energy Trust as an efficiency improvement:

Well we could debate this I suppose but you know duct cleaning in and of itself is an energy-of course for health and mechanical hygiene it's a feel good thing and house cleaning thing. But it also adds improvement to efficiency of your furnace. When you clean air conditioning coils, when you clean furnaces and duct systems believe it or not it's an efficiency thing and Energy Trust doesn't recognize that.

Energy Trust should also be aware of the barriers to offering the service include cost-effectiveness, and safety:

Occasionally the home is already efficient in the ways that we would improve. The ducts are already well sealed. In other cases, doing energy efficiency work would decrease the safety of a home, create indoor air quality problems, or mold problems, and so we recommend that if they want to make it more energy efficient, they would have to remediate some of those problems and that increases the cost by quite a bit and so generally we tell the homeowner that's not cost efficient at that point.

Insulation[6]

The trade allies believe the insulation incentive is very important to the market. According to trade allies, taking away the incentive could decrease business by up to 40 to 70 percent. Current incentive levels are satisfactory, but incentives could be expanded to more areas such as testing and air sealing. Marketing would also help increase the number of jobs.

Comments on Energy Trust's Market Assessment

[6] We conducted six interviews with a focus on insulation. Most have been trade allies since Energy Trust started, but one mentioned only a year and a half. In 2008, they performed anywhere from 15 to over 300 insulation projects for Energy Trust of Oregon.

Three trade allies commented on the market assessment. One felt the numbers were a bit different for Bend:

> *I think some of the-just and this is a gut feeling only, this isn't based on any fact that - I'm thinking that in our area, in the Bend area that the eligible housing might be a little bit more than or a little bit less than what they're actually saying…The reason being I'm in Bend and you know we've had a real building boom over the last 20 years and the energy codes have been in affect during that time period. Prior to that two of our utilities which aren't Energy Trust utilities also had pretty strong programs as far as weatherization so there's a lot of houses either new that are to code or were picked up underneath through CEC in mid state and stuff so. The older house market I don't think there's as many here that are as eligible.*

The other two agreed with the assessment for the most part:

> *Because of the home energy reviews, yeah probably 80% of those homes do need more insulation… Insulation levels do need to be increased.*

> *Well yeah in some ways. It's hard for me as a contractor just to evaluate like for instance how many homes still need additional insulation. It's hard for me to evaluate where we're at on that in the region in the area that I work with. You know just by people calling and asking for bids it's hard to judge. But just in my head I would say that pretty accurately there are around 50 or 51% of single families, 56%. I would say yeah there's still that much work out there or still that much residential areas that could be insulated that need insulation in houses…I pretty much agree with that assessment there*

Effect on Insulation Market

The insulation trade allies believe that the Energy Trust incentive is very important in the insulation market, especially in this economy:

> *I think it's starting to make some people more aware that, well just the whole -more aware of energy efficiency…There's significant cash, you know a significant rebate. It's enough to -people call-it's enough to have people actually go ahead and do the work. You know when they find out how much money that they can be getting back off of these.*

> *If I was to describe it it's definitely drawing more business. It's definitely helping the consumers to make that decision to do the weatherization… Any dollars that they can get help to pay for the job is definitely crucial.*

Without the incentive, the trade allies believe the business would be down, as much as 40 to 70 percent:

Well because the way the economy is right now without the rebate program a lot of customers probably wouldn't spend the money… Oh I would guesstimate that it would decrease probably by about 40%.

I think it's going to change significantly. People - I think this incentive is what puts people over the so called hump to say yeah I want to move forward with this. I think it would change significantly

To be honest if I was to say out of a hundred jobs if we were to bid it and they wouldn't get the rebates, you know if I bid a hundred jobs we're going to get about seventy of them. Ok so seventy percent because of the ETO. If we weren't able to offer that incentive we'd probably only be landing about thirty percent of those because people just plain wouldn't be able to afford it.

Support from Net to Gross Findings

Our calculations from the single family participant survey indicate that Energy Trust is responsible for 62% of the energy savings from insulation rebated through the Energy Trust program (note that this does not include spillover from participants who received rebates for other items). This is in line with the trade allies' perception that the incentive is important to the market and that taking it away could decrease business by 40 to 70 percent.

Recommendations from Trade Allies

The trade allies mostly offer things that are eligible for rebates, although one offers air sealing which he said is no longer eligible, and another offers duct sealing but is not certified yet to offer rebates through Energy Trust. One contractor suggested that fireplaces be incentivized by Energy Trust. One contractor said they are expanding their offerings beyond insulation:

We've increased - again, currently we're only doing insulation. We're going into the duct blaster and the air sealing and stuff like that but when we first started out we were only doing attics, adding insulation to attics but now we're doing attics, crawl and walls. All three phases that we're currently able to do for Energy Trust.

Overall, the trade allies believe the incentive levels are satisfactory, although of course more is always better:

Obviously, if they were increased, that would help, but what Avista does is they do each one unique depending on existing insulation levels, whereas Energy Trust uses a qualifying is not qualifying. So right now if you have a home which is heated with gas, you can get a substantially larger repeat from Avista than you can from Energy Trust. Now I don't understand the process Energy Trust used to arrive at rebate formulas, but they're satisfactory, but they're lower than what's available through Avista.

Two trade allies thought insulation incentive levels were good but suggested expanded rebates for other areas, specifically paying more for air sealing and duct sealing. One of these comments included:

> *I think they do pay quite a bit, the footages that they pay back is good. Again, going into the air sealing and duct sealing I think they could pay more for the testing. For instance, the duct sealing testing they only paid thirty-five dollars when it's realistically anywhere from three to five hundred dollars to do the test itself and they pay thirty-five dollars, if they paid a little more for that. But as far as the insulation, it seems to be fair… Yeah the one area I'd like to see an improvement is on the foam. They offer incentives on our values and weather sealing, but I think they need to come up with a way to offer a higher incentive if somebody selects to use spray foam versus fiberglass*

Another trade ally felt more marketing was needed:

> *I think you're right on the money there; they're good…The incentives right now is great. I think it might need just a little more marketing. I mean probably between 10, 15% of the people that I go out and talk to really don't know about the Energy Trust.*

Windows[7]

Trade allies had mixed opinions about the value of the window incentive. However, three of the trade allies though removal of the incentive would decrease the efficient window market. Trade allies suggested various changes to the incentives, including removal of the requirement for other measures, expanding the square footage, and increasing the efficiency requirement.

Two of the trade allies recommended that efficient doors be considered for Energy Trust rebates.

Comments on Energy Trust's Market Assessment

For the most part the trade allies agreed with the market assessment, although two differed slightly on the percentage of ranges of u-values installed.

Of the two trade allies agreed with the market assessment, only one offered any specifics:

> Yeah, I thought they were pretty close aligned to what I understand, yeah… the window manufacturers match the efficiencies that are requested by the Energy Trust, so in other words, there isn't, they keep getting better because

[7] We conducted five interviews with a focus on windows. These contractors have been trade allies from two to nine years. In 2008 they completed from two to over 10 window jobs with Energy Trust.

of the driving force, not necessarily on their own, so yeah, if there wasn't an Energy Trust, they might not be as efficient as they are.

Another two trade allies offered specific comments on the u-value windows:

> *Overall I think you know I would say overall probably it's pretty close…Well probably one of the biggest things I think is the percent of 2008 residential windows installed by efficiency the 26 to 30 u value probably 98% of our windows are that and not the 70 something that they've got.*

> *As far as windows that have a U value of less than .26 that's pretty rare, that's pretty much only triple pane windows which in this market is very, very minimal. I mean I'm sure it's different in different parts of the country, but in Oregon most of the double pane windows well it doesn't really matter which or what state it's in most double pane windows have about the best U value you can get typically it's around a .28 and so really a .26 U value doesn't exist on a double pane window for the most part so that's and I know there's a certain amount of things you know how many windows you know .26 value or less and then the .26 to .30 and that sort of thing…But I would say in our case we probably sell triple glazed windows that's like maybe 1% of our sales a year so anything that's .26 or lower is maybe 1% which I think is what this graph says but I can't read it for sure.*

Effect on the Windows Market

The trade allies had mixed opinions about the value of the Energy Trust incentive. Only one expressed high importance:

> *I think it's making people more aware energy efficiencies especially with the new federal tax credit. People are really starting to dig into and seeing the benefits of having a high efficiency product.*

Two others felt it was important but did not clearly explain why. A fourth mentioned that it only affects about 10 to 15 percent of jobs:

> *It's tough to say because a lot of the people that want to go through the program don't because of the secondary measure but I would say that it does have a positive effect. How many jobs does it actually affect? I would say probably in our case 10 to 15% of the jobs we do it has an effect on that. I would say because a lot of people don't qualify I would say moderately [important].*

And the last mentioned that it drives prices down:

> *I think basically the biggest effect it has is it drives the price down because there's so much competition for lower costs.*

However, only one trade ally said that the absence of the incentive would have no effect on the market. Three mentioned some kind of effect. Comments included:

> *I think a lot of people would not buy as an energy efficient window as they do now because they go-they pay a little bit more for a higher efficiency window because they're getting a rebate.*

> *The quality of windows would not be as high. I think they're a driving force in efficiency.*

Another trade ally thought the effect would only be significant in multifamily, not single family:

> *Probably not a significant amount in owner occupied residential. However, multi family would be changed considerably I think and we do a certain amount of multifamily and the program is much more lenient towards multifamily programs than it is for owner occupied residential so you know being that those are kind of two different categories the owner occupied residential probably wouldn't be affected significantly it would to some degree but not significantly. The multi family would have a pretty good impact on that market.*

Support from Net to Gross Findings

Our calculations from the single family participant survey indicate that Energy Trust is responsible for 52% of the energy savings from windows rebated through the Energy Trust program (note that this does not include spillover from participants who received rebates for other items). This indicates that about half of customers would have installed efficient windows anyway, and may explain why trade allies had mixed opinions about the value of the incentive. It is clearly valuable to many people, but not to an overwhelming majority. Perhaps some of the suggestions given by the trade allies could increase the value of the rebate to people, enticing more customers to upgrade to efficient windows.

Recommendations from Trade Allies

Two trade allies thought the qualifications should be changed:

> *Well yes if they would change the qualifications for window rebates to make them independent of an additional project.*

> *Well probably higher incentives for the customer…I I think probably by bigger square footage rebate for windows possibly would help. The other thing they require at least 2 energy efficient items be done and I think there's a lot of people out there that only need 1 or only would like to do 1 at a time and so therefore they don't go with the program because Energy Trust requires that they do two majors, two energy majors.*

And another felt the requirements should actually be more stringent:

> *I think the new incentives are good right now. I think they could lower them-I mean not lower them but make them more stringent so that people are more apt to go with a better window than a not so good window.*

One of the trade allies also thought the incentives should be marketed better to rental properties:

> *Yeah I think they could do something more for the rental business because I think they do have some renters that aren't aware of the program until we tell them about it and I think if they had a little bit more aggressive program they could get more renters you know rental properties that would go with an energy efficient product versus the crap they usually put in.*

Two trade allies suggested that doors should also qualify for rebates:

> *Our entry doors and our all season patio rooms should be [considered for rebates]…Because our all season patio rooms uses the same glass packs that our windows use so they're just as energy efficient. And our doors are a very high efficient window and there-the manufacturing process is considered green because it meets all the guidelines to be a green product.*

> *Well because a lot of the old doors that are coming out are horribly inefficient and the new doors that we are putting in are many times more efficient but do not qualify for the program.*

FAX

TO: FAX:

FROM: DATE:

RE: Energy Trust of Oregon Trade Ally Interview PAGES: 5

The following is an excerpt from the 2009 Trade Ally Survey describing a market in which you are a trade ally partner. Please read the following pages prior to your scheduled interview and consider whether you feel this is an accurate description of the market.

Gas Furnaces

Percent total gas furnace sales for existing homes by efficiency*

	Gas Furnace
Count	19
95% or more efficient	33%
90%-94% efficient	28%
80%-89% efficient	39%

*Weighted by firm size.

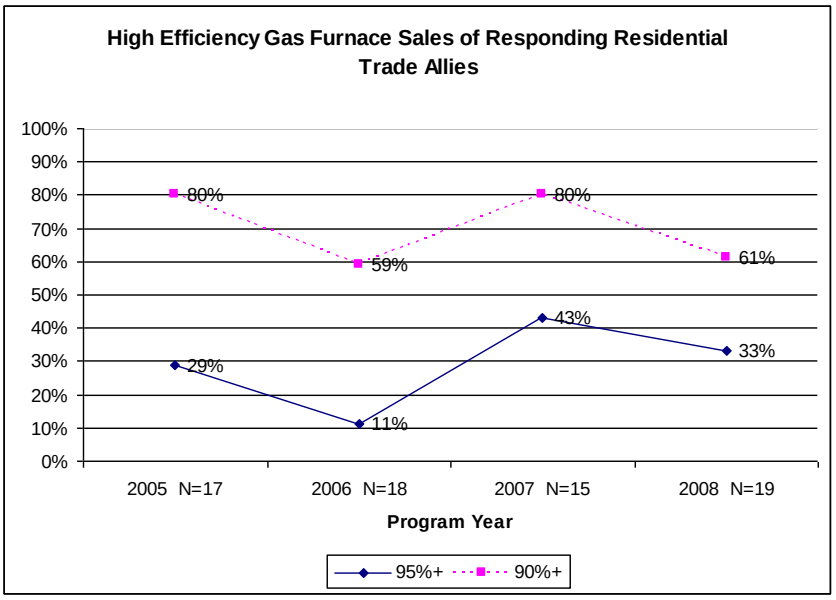
As with last year, the majority of gas furnace installations in existing homes by responding trade allies were using high efficiency equipment (90% or more efficient). The 61% of installed furnaces that are high efficient is a noticeable decrease from the 80% that were reported in 2008.

The following graph shows the percentage of responding allies furnace sales that are high efficiency furnaces (90% or more efficient), and the proportion of those high efficiency furnaces that are 95% efficient, as reported in the last four trade ally surveys. According to survey respondents the percentage of high efficiency furnaces that are 95% efficient has increased over the last four years, although overall the market share of high efficiency furnaces has not increased.

These findings are relatively consistent with those of the Gas Furnace Market Transformation Study currently being conducted for Energy Trust. Three surveys of gas furnace contractors and distributors were conducted; two in Oregon and one in Clark County, Washington. These surveys consistently estimated the market share of high efficiency gas furnaces (AFUE 90% or more) at 63-64%, an estimate consistent with the responses to this survey.

However, these surveys estimate the market share of gas furnaces with AFUE 95% or greater to be 5-13%. This indicates that either contractors responding to the trade ally survey consistently overestimate the market share of these furnaces (or the respondents to the Market Transformation surveys underestimate their market share), or that contractors involved with Energy Trust typically move more

efficient furnaces. This may indicate that Energy Trust support and Energy Trust incentives are important elements in getting furnaces with an AFUE 95% or higher installed.



Percent total gas furnace sales for new homes by efficiency*

	Gas Furnace
Count	15
95% or more efficient	22%
90%-94% efficient	29%
80%-89% efficient	47%

*Weighted by firm size.

Gas furnaces installed in new homes are split almost evenly between high efficiency and 80-89% efficient equipment. New homes are less likely to have 95% efficiency furnaces, and more likely to have 80-89% efficiency furnaces installed, than are existing homes that are buying a new furnace.

Estimated cost differential (equipment and installation) between a code (80% efficient) furnace and a standard condensing furnace (90-94% efficient)

	Gas Furnace
Count	19
$501-$750	21%
$751-$1,000	32%
$1,001-$1,250	26%

Over $1,250	21%

When asked to estimate the cost differential between a code furnace (80% efficient) and a standard condensing furnace (90-94% efficient) over half estimated the incremental cost being under $1,000, the most common estimate being between $751 and $1,000. Interestingly, one fifth of the respondents thought the difference was less than $750, and one fifth though it was more than $1,250. All four trade allies that estimated the cost differential to be under $750 are located in the Portland Metro area, while those who estimated the difference to be over $1,250 are located throughout western Oregon.

Percent total 2008 gas furnaces installed with specific technology*

	Gas Furnace
Count	15
Included an ECM	41%
Included an air cleaner	66%

*Weighted by firm size.

When weighted by firm size, approximately 41% of gas furnaces installed in 2008 had an ECM, and 66% had an air cleaner. Depending on their use, the presence of air cleaners may have implications for energy savings achieved by energy efficient furnaces, as they are typically meant to run continuously. Future research should look into the behavior of home owners in regards to their use of air cleaners.

Estimated cost differential between a furnace with an ECM and one without

	Gas Furnace
Count	19
$200-500	16%
$501-$750	21%
$751-$1,000	42%
Over $1,000	21%

When asked about the cost differential between a furnace with and without an ECM (electronically commutated motor?) the most frequent estimate was between $751 and $1,000. In 2008, just 25% of respondents thought the differential was between $751 and $1,000, and just 5% thought it was over $1,000.

Awareness of the planned discontinuation of gas furnace incentives

Count	19

Yes	79%
No	21%

At the time the survey was written, Energy Trust was planning to discontinue incentives to most residential customers for high efficiency gas furnaces on May 1, 2009. When asked if they were aware of this change, 79% indicated that they were. Since then, the residential program has elected to reduce incentives to $100 for the remainder of 2009.

How would the discontinuation of gas furnace incentives affect your sales of high efficiency (AFUE 90% or more) gas furnaces?

Count	19
Prohibit all sales of high efficiency furnaces	0%
Reduce sales substantially	63%
Reduce sales somewhat	32%
Reduce sales slightly	5%
Would not affect sales at all	0%

When asked how they expect the discontinuation of the gas furnace incentive to effect their sales of high efficiency furnaces, the majority (63%) responded that it would 'reduce sales substantially'. The remainder of the respondents indicated that the discontinuation will reduce their sales to a lesser degree.

Suggestions for Gas Furnace Emerging/Existing Technologies

Trade Allies were asked if there were any emerging/existing technologies related to gas furnaces that they would like to see Energy Trust provide incentives for. The following 11 responses were provided:

- 95% and above (3)
- ECM motors (2)
- 90% and above (2)
- Homeowners will not opt for the higher efficiency without the incentive
- Air quality products
- Heat recovery ventilation systems
- Multi-stage

Gas Furnace Summary and Recommendations

The majority of gas furnaces installed by responding trade allies were high efficiency (90% efficient or higher) and included air cleaners. Future research should be conducted to examine the prevalence with which air cleaners are installed with gas furnaces, home owners' use of air cleaners, and the effects they may have on energy savings.

All responding trade allies that primarily install gas furnaces indicated that discontinuation of incentives for high efficiency furnaces would negatively affect sales, the majority thinking it would do so substantially. It is recommended that future research be conducted at the distributer level of the furnace market to

examine the effect that the reduction of Energy Trust incentives has on high efficiency furnace sales.

That 21% of these respondents were unaware of the planned changes concerning gas furnaces indicates some miscommunication between Energy Trust and these trade allies. Efforts should be made to make important program changes clear on both the Energy Trust website and the Insider newsletter, and to increase awareness of these resources among contractors.

FAX

TO: FAX:

FROM: DATE:

RE: Energy Trust of Oregon Trade Ally Interview PAGES: 4

The following is an excerpt from the 2009 Trade Ally Survey describing a market in which you are a trade ally partner. Please read the following pages prior to your scheduled interview and consider whether you feel this is an accurate description of the market.

Heat Pumps

Percent of 2008 heat pump sales by efficiency*

	Heat Pump
Count	14
HSPF 9.5 or better	9%
HSPF 9.0-9.4	27%
HSPF 8.5-8.9	25%
HSPF 8.2-8.4	19%
HSPF code	19%

*Weighted by firm size.

While there was very little change in the reported percentage of heat pumps installed in 2008 that had an HSPF of 9.0 or better, the average HSPF appears to have decreased from last year. There was a significant rise in the reported percentage of heat pumps that had a code HSPF or an HSPF of 8.2-8.4, from 6% to 19% and from 9% to 19%, respectively.

Awareness of Energy Trust's change in heat pump incentives

Count	14
Yes	93%
No	7%

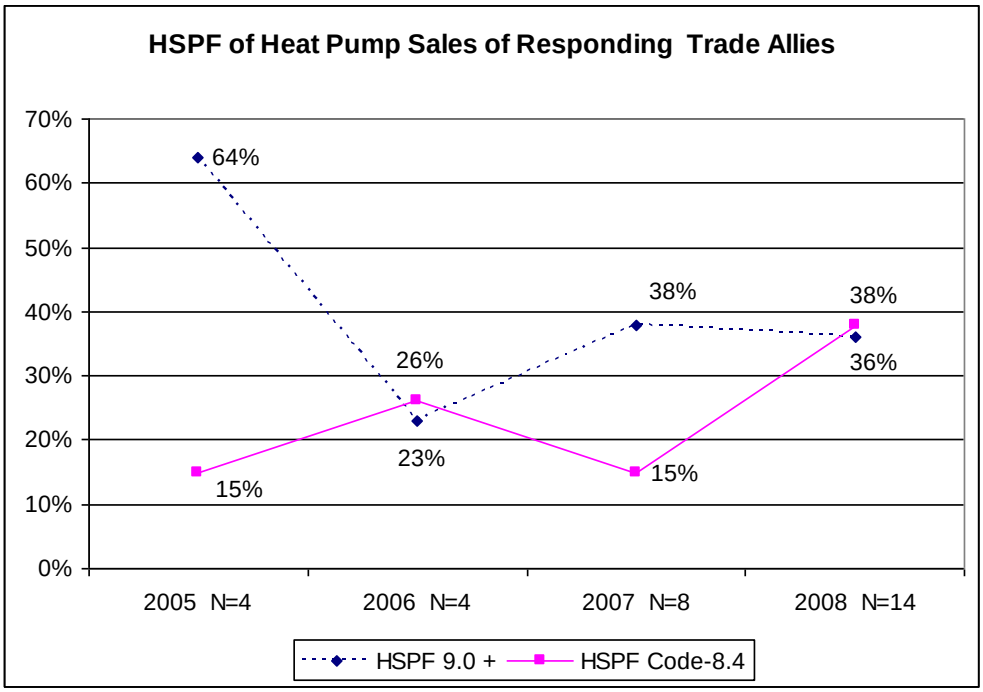
On May 1, 2009, Energy Trust changed the heat pump incentive to require an HSPF of 9 or more for heat pumps under 5 tons. When asked if they were aware of this upcoming change, just 7% indicated that they were not.

If the requirement for heat pumps were to increase, how would it affect your customers' choices in heat pumps?

Count	13
Most would not install a heat pump	8%
Most would choose HSPF below 8.2	8%
Most would choose HSPF 8.2-8.9	31%
Most would choose HSPF 9.0 or above	8%
Don't know	46%

Respondents were then asked how they expect the change in incentive will affect customers' choice in heat pumps. While the most frequent response was that they didn't know, 31% indicated that customers would choose a heat pump with an HSPF between 8.2 and 8.9. Just 8% indicated that customers would choose a heat pump that was eligible for an Energy Trust incentive.

The following graph charts the percentage of respondents' heat pump sales that had various HSPF levels, as reported in the last four trade ally surveys. Of primary concern are high efficiency heat pumps (HSPF 9 or more) and the relatively low efficiency heat pumps (HSPF code-8.4). The percentage of respondents' heat pump sales that have an HSPF that is code-8.4 has reportedly been increasing over the last four years. Future research should be conducted to examine the effects that increasing the Energy Trust requirements of heat pumps will have on the market shares of heat pumps with various efficiency levels.



Estimated cost differential (equipment and installation) between a code (7.8 HSPF) heat pump and a heat pump with a 9 HSPF

	Heat Pump
Count	13
$200-500	8%
$501-$750	15%
$1,000-$1,250	39%
Over $1,250	39%

When asked to estimate the cost differential between a code heat pump (7.8 HSPF) and a 9 HSPF heat pump, 78% responded that it was over $1,000.

Percent of jobs that use commissioning

	Heat Pump Commissioning
Count	13
0%	31%
1-24%	23%
25-49%	23%
50-74%	8%
75-100%	8%
Don't know	8%

Just 24% of responding residential trade allies that primarily install heat pumps indicated that they use commissioning on more than half of their jobs. Last year 50% of respondents indicated that they used commissioning more than half of the time.

Reasons for not using commissioning

	Heat Pump
Count	13
Takes too much time	31%
Do not trust results	8%
Too expensive	62%
No customer demand	46%
Do not need commissioning, standard diagnostic adequate	31%

The two most common responses for why trade allies were not using commissioning on their jobs were that it was too expensive, and that there was no customer demand.

'Other' reasons provided for not using commissioning on heat pump jobs were:

- Complicates the process and makes it very expensive for owners
- Cost of testing does not outweigh the incentives

- My systems are fired off by factory trained tech, and commissioning is wasteful and timely

Heat Pump Summary and Recommendations

All but one of the responding trade allies that primarily install heat pumps were aware of the planned changes for heat pump incentives; just 8% of whom thought that customers would respond to the increased requirements by choosing the more efficient technology. This may be due to the perception among the majority of respondents (78%) that heat pumps with an HSPF of 9.0 cost over $1,000 more than a heat pump with a code HSPF. Future market research should examine the effect of Energy Trust incentive changes on the residential heat pump market.

Responding trade allies reported a large increase in the percentage of heat pump installations that did not qualify for Energy Trust incentives in 2008 (HSPF below 8.5) when compared to previous years. Respondents also indicated a decrease in the frequency with which commissioning was used in 2008 compared to 2007; the majority cited excess cost as the main reason why they didn't use commissioning.

FAX

TO: FAX:

FROM: DATE:

RE: Energy Trust of Oregon Trade Ally Interview PAGES: 2

The following is an excerpt from the 2009 Trade Ally Survey describing a market in which you are a trade ally partner. Please read the following pages prior to your scheduled interview and consider whether you feel this is an accurate description of the market.

Duct Sealing and Duct Insulation

The percentage of duct sealing and insulation jobs done by type of building*

	Duct sealing and duct insulation
Count	6
New buildings	1%
Existing buildings	98%

*weighted by firm size

Almost all duct sealing and duct insulation jobs done by respondents in 2008 were for existing homes.

Percentage of 2008 duct sealing jobs that also had duct insulation installed

	Insulation
Count	8
0-24%	38%
25-49%	13%
50-74%	25%
75-100%	25%
Don't know	0%

Half of responding residential trade allies that primarily perform duct sealing performed duct insulation on 50% of their jobs or more. Thirty-eight percent of these firms performed duct insulation on less than one quarter of their duct sealing jobs. A lack of insulation and air sealing could potentially be negatively affecting the energy savings from duct sealing jobs. The interaction between duct sealing, duct insulation, and air sealing should be further examined to determine the effect on energy savings.

Percentage of homes by heating fuel type where insulation work was done*

	Duct insulation

Count	6
Gas	65%
Electricity	28%
Oil	6%
Other	0%

*Weighted by firm size

Two thirds of 2008 duct insulation jobs by respondents were performed on gas heated homes. Most of the other homes had electric heat.

Issues with New Building Codes

Residential duct sealing/insulating allies were asked if they had any issues with the new residential building codes that went into effect in April of 2008. There were four responses; three people said 'no', and one person said that 'venting now is just plain crazy'.

Awareness that Energy Trust is changing the duct sealing incentive

Count	8
Yes	100%
No	0%
Don't know	0%

On May 1, 2009, Energy Trust changed the incentives for duct sealing to half of the cost, up to $400, for electrically heated homes, and half the cost, up to $350, for gas heated homes. All of the trade allies responding were aware of the proposed changes in incentives.

How would the change in duct sealing incentives affect your sales of duct sealing work?

Count	8
Prohibit all sales of duct sealing	25%
Reduce sales substantially	50%
Reduce sales somewhat	13%
Reduce sales slightly	0%
Would not affect sales at all	13%

When further asked about how this change in incentives would affect sales of duct sealing work, one quarter indicated that it would prohibit all sales of duct sealing. One half of respondents thought that the change would substantially reduce their sales.

Duct Sealing and Duct Insulation Summary and Recommendations

Respondents who primarily installed duct sealing and duct insulation reported that almost all of their jobs were done on existing homes, two thirds of which were heated by gas. These contractors were all aware of the proposed changes to Energy Trust incentives for duct sealing, and primarily expected negative affects to result. One quarter indicated that the change would prohibit future sales of duct sealing, while another 50% indicated that the changes would substantially reduce sales.

It is recommended that further research look into the interaction between duct sealing, duct insulation, and air sealing, to look at the effect that this interaction may have on energy savings.

FAX

TO: FAX:

FROM: DATE:

RE: Energy Trust of Oregon Trade Ally Interview PAGES: 2

The following is an excerpt from the 2009 Trade Ally Survey describing a market in which you are a trade ally partner. Please read the following pages prior to your scheduled interview and consider whether you feel this is an accurate description of the market.

Insulation

Percent of existing homes that still need additional insulation*

	Insulation
Manufactured homes (N=9)	57%
Multifamily (2-4 units) (N=12)	59%
Multifamily (5+ units) (N=11)	51%
Single Family (N=14)	56%

When asked about the need for additional insulation in homes in both Energy Trust service area and individual contractor service area, responding trade allies reported that over half of all homes (single family, multifamily, and manufactured) required additional insulation. Data on the recommendations resulting from Home Energy Reviews (HERs) performed by Energy Trust in 2007 and 2008 shows that 80% of those homes that received an HER could use additional insulation. The following table compares the percentage of these homes that could use specific types of insulation as reported by survey respondents with the recommendations from the HERs.

Percent that could use insulation that can be economically done

	Survey Respondents	Home Energy Reviews
Count	14	12,076
Ceiling	90%	73%
Walls	74%	49%
Floor	80%	62%

Respondents felt that in the majority of those homes that still needed more insulation it could be economically done; especially for ceiling and floor insulation. Although these estimates were consistently

higher than the recommendations provided by Home Energy Reviews (25-50% higher), It does appear that the majority of homes that could use additional insulation would benefit from ceiling and floor insulation.

Percentage of 2008 insulation jobs that had air sealing performed

	Insulation
Count	15
0%	20%
1-24%	13%
25-49%	7%
50-74%	20%
75-100%	33%
Don't know	7%

One third of responding residential allies that primarily install insulation performed air sealing on 75-100% of their jobs; one fifth didn't perform air sealing on any of their 2008 insulation jobs.

Insulation Summary and Recommendations

Responding residential trade allies that primarily install insulation feel that the majority of existing homes could still use more insulation, 74-90% of which could be done economically. One fifth of these respondents indicated that they did not perform air sealing on any of their 2008 insulation jobs.

FAX

TO: FAX:

FROM: DATE:

RE: Energy Trust of Oregon Trade Ally Interview PAGES: 3

The following is an excerpt from the 2009 Trade Ally Survey describing a market in which you are a trade ally partner. Please read the following pages prior to your scheduled interview and consider whether you feel this is an accurate description of the market.

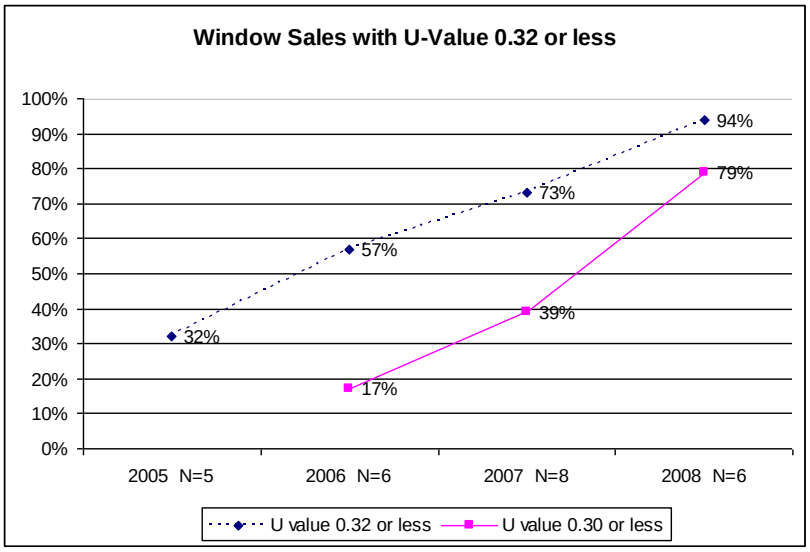
Windows

Percent of 2008 residential windows installations by efficiency*

	Windows
Count	6
0.26 U value or less	1%
0.26-0.30 U value	78%
0.31-0.32 U value	15%
0.33-0.34 U value	4%
0.35 U value	3%

***Weighted by firm size

The following graph shows the percentage of respondents' window sales that had a U Value of 0.32 or less and the percentage that had a U Value of 0.30 or less, as reported in the last four trade ally surveys. According to respondents, the share of their window installations involving high efficiency windows has steadily increased over the last four years.

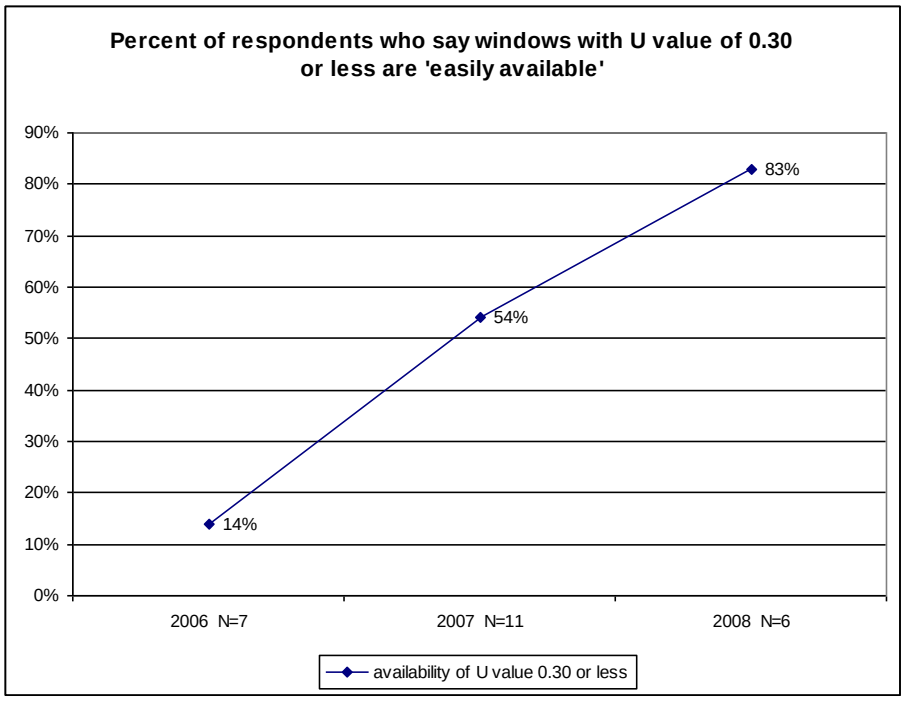


Residential trade allies that primarily installed windows were asked about the efficiency of the windows they installed. Seventy-nine percent of the windows installed by respondents had U value between 0.26 and 0.30, the level needed to qualify for Energy Trust incentives. This is a large increase over the 39% of window installations with a U value between 0.26 and 0.30 in 2007. The above chart shows the growth in market share of energy efficient windows over the last four years, as reported by respondents to the trade ally survey.

Availability of windows with specific U-Values

	Less than 0.26 U-value	0.26-0.30 U-value
Count	5	6
Not available at all	20%	0%
Difficult to get	40%	17%
Some models are available	20%	0%
Easily available	0%	83%
Don't know	20%	0%

Respondents were asked about the availability of windows that qualify for Energy Trust incentives. While the majority of respondents felt that windows with a U value of 0.26-0.30 were easy to get, more efficient windows appear to be more elusive. Twenty percent reported that they could not get more efficient windows at all, and 40% responded that they were available but difficult to get. The following chart shows the change in availability of windows with a U value of 0.30 or less over the last three years, as reported by respondents to the trade ally survey.



Windows Summary and Recommendations

Respondents report that energy efficient windows with a U value of 0.32 or less continue to gain market share, and now dominate the majority of these contractors' window installations. While windows with a U value of 0.30 appear to be easily available in most areas, just 1 of the respondents indicated that more efficient windows with a U value of 0.26 were not difficult, if not impossible to get.

It is recommended that Energy Trust examine the Northwest Energy Efficiency Alliance (NEEA) information on the market transformation of high efficiency windows to see if Energy Trust is having additional impact on the window market. Energy Trust may be able to claim savings for its role in the market transformation for windows.

Appendix C. ENGINEERING ANALYSIS

Heschong Mahone Group, Inc.
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Fair Oaks, CA 95628 (Sacramento area)
Phone: (916) 962-7001, Fax: (916) 962-0101
E-mail: info@h-m-g.com

July 21, 2009

MEMO

To: Energy Trust of Oregon

Cc: Opinion Dynamics

From: Heschong Mahone Group, Inc.

Re: Home Energy Solutions Program - Engineering Estimates Review

1. PURPOSE OF TASK

The purpose of this memo is to review estimates of energy savings for Energy Trust of Oregon's Home Energy Solutions program.

The completion of this task involved:

1. Review (to the extent possible) and documentation of Energy Trust's savings estimates for each program measure,
2. Verification of the assumptions regarding measure installation and operation, and
3. Comparison of program estimates to industry standards.

Industry standards came from impact evaluation studies, technology assessments, efficiency program work-papers, engineering references, and/or manufacturers' catalog data. Baseline estimates were also reviewed and compared to available market studies.

In the next section (Section 2), we provide an overview of the findings from our analysis, as well as a summary of process-based recommendations to help with future efforts. Section 3 documents the available details per measure, and can serve as the starting point for any future reviews.

2. OVERVIEW

The study process consisted of the Trust gathering data files, HMG review of program savings estimates, collection of comparative engineering estimates sources, and teleconferences between HMG and the Trust to clarify program and study information. We note that while Energy Trust provided information and updated values over time, in order to keep within budget and provide this memo, we reviewed only values provided to us as of May 21, 2009.

2.1 Summary of Analysis

We reviewed 32 distinct measures within the Home Energy Solutions (HES) program. Based on our review of the information available, we grouped these measures into four categories.

1. Good as is: estimates that seem to fall within a reasonable range and do not need further study at this time.
2. Recommend further study: estimates that fall outside of a reasonable range and for which we recommend further study.
3. Recommend revisions: estimates where our analysis lead us to standard source that should be considered by Energy Trust.
4. Could not determine how measure was created but seems reasonable: Similar to the first category, these estimates fall within a reasonable range and do not require further study at this time; however, we note that the basis of the estimates were not fully documented therefore could not be fully reviewed.

The summary of our review is shown in Table 1.

Measures	That save kWh	That save therms	Total[1]
Total reviewed	**19**	**18**	**32**
Good as is	*8*	*7*	*15*
Recommend further study	*2*	*0*	*2*
Recommend revisions	*3*	*5*	*7*
Could not determine how measure was created, but seems reasonable	*6*	*6*	*8*

Table 1. Measure Review Summary

2.1.1 Measures that are good as is

1. Forced Air Furnace to heat pump 8.5+ HSPF
2. Heat Pump upgrade 8.5 HSPF

[1] Values provided in this column note number of measures reviewed, not the summation of the counts provided in the "That save kWh" and "That save therms" columns. Please note that some measures have both kWh and therm savings estimates.

3. SF showerhead, electric
4. MF Showerhead, electric
5. SF Showerhead, gas
6. MF showerhead, gas
7. SF aerator, electric
8. MF aerator, electric
9. SF aerator, gas
10. MF aerator, gas
11. .62 Efficiency Gas water heater
12. SF tankless water heater
13. MF tankless water heater
14. .93 Efficiency 50-gal electric water heater
15. Marathon 50-gal electric water heater

2.1.2 Measures that need further exploration

1. SF CFL
2. MF CFL

Currently, a heat interaction penalty is used in the savings estimates. Further study is required to determine the extent of the heat interaction. Caution should be taken in determine which assumption in the savings calculation accounts for the differences found in the measure impact savings.

2.1.3 Measures that Energy Trust should consider revising

1. MF Electric Hot Water and Dryer
2. MF Gas Hot Water & Dryer

We recommend the savings estimates derived from the Energy Star calculator in replacement of the Maytag calculated savings used by the program. This reduces the possibility of manufacturer bias in savings calculation. Also, ENERGY STAR breaks apart gas, electric, and water savings which reduced the possibility of double-counting values.

3. SF High efficiency gas furnaces
4. MF High efficiency gas furnaces
5. Manufactured Homes High efficiency gas furnaces

We recommend the savings estimates derived from numbers from the Ecotope report (Energy Trust potential study for the program) because it provides a documented savings estimate. There was no documentation provided on current measure estimates.

6. SF Windows, electric heat
7. SF Windows, gas heat

We recommend the savings estimates derived from ResFen, utilizing the Efficient Windows Collaborative simulation assumptions. There was no documentation provided on current measure estimates.

2.1.4 Measures that could not be reviewed

1. Attic insulation
2. Floor insulation
3. Wall insulation

There were two different (but similar) values provided for each insulation measures. The first set of values provided had unclear unit measurement. The second set of values were given in energy savings per square feet and verbal communication with the Trust indicated that it was derived from a program field study, which we were unable to verify. The values appear somewhat higher than other reported study estimates. However, until the assumptions underlying the estimate is provided and understood, it is difficult to know for certain the reasonableness of the program value.

4. Manufactured Homes Ducts and Air Sealing (MOBES)

While values were provided for this measure, along with verbal correspondence on when the estimates were revised, we were not provided with documented savings estimates to review.

5. SF HVAC Duct Seal - gas
6. SF HVAC Duct Seal - electric
7. SF Air Seal - gas:
8. SF Air Seal - electric

It appears savings estimates can be derived from numbers from the Resource Assessment tool used for the Energy Trust Potential Study for the Energy Trust, but the tool was not provided for. There was no documentation provided on current measure estimates nor a better measure description (type of air leakage reduction). Using D03-418 DEER values for CA Climate Zone 1, Code kWh values range from 71 to 219 depending on building vintage, which are lower than what Energy Trust is using.

-

2.2 Process Summary

Program engineering estimates provide the framework for setting goals and estimating achievement. The goal in using program engineering estimates is two fold:

1. Improve the reliability of savings estimates
2. Inform future program planning processes

As such, strong engineering estimates (and the review of these estimates) can help improve program delivery and reduce risks to the portfolio.

Our engineering analysis included a review of the available measure-specific information provided by Energy Trust. Through our analysis of the information provided, we uncovered several challenges:

- Many of the current estimates are not engineering-based estimates. Several of the current estimates used by Energy Trust come from prior reports and or other sources without an engineering algorithm.
- Several of Energy Trust's estimates do not have documentation of their source, but were just provided in an email or table to the evaluation team. For example, while showerheads and aerators savings estimates were derived from notated studies, the basis of the duct sealing savings estimates was unclear to program staff.
- The level of documented detail behind the current estimates differs among the numerous program measures within the HES program.
- The HES program saving estimates are revised on a continuous basis due to information from program evaluations, field data, and/or in-house planning decisions. (Notably, the continuous nature in updating program estimates made the review less straight-forward than originally anticipated. Differing values, as well as measure lists, were provided during the course of the review.)

Accurate understanding of the expected per unit measure savings, along with the key assumptions behind these estimates—such as weather sensitivity or occupant behavior to determine measure usage—allows program goals to be more realistic, ensuring that actual savings do not fall short of expected savings.

Through careful documentation of program engineering estimates, comparisons can also be made between the program engineering estimate to actual participant usage and measure performance. The resulting comparative analysis could yield valuable information on what changes may be necessary in the engineering estimate's default assumptions. Understanding these changes and utilizing this information to improve program delivery is an important mechanism in gaining greater program effectiveness.

Because of the varying nature of the information provided to the evaluation team, the value of our engineering review is somewhat limited. We were unable to provide an analysis of the assumptions behind many estimates since several were not documented.

Going forward, we recommend that Energy Trust retain this memo as the starting point for future efforts, update this list as changes are made (documenting sources along the way), and work to clarify details behind some of the non-engineering based estimates.

Notably, our team will also compare the current program estimates (shown in the table below) to estimates from our billing analysis to show areas where current assumptions may not be in line with actual savings estimates.

3. DETAILED INFORMATION

This section contains the details for the measures summarized in the earlier section. Table 2 provides a summary of the original and recommended per-unit savings for each measure detailed in the report and can provide a central starting point for future efforts.

The following sections provide the documented review procedure, what we understand about how each measure value was determined, and recommendations for changes to the program assumptions, where applicable.

	Measure Description	ETO Program Estimate	Recommended Engineering Estimate	Units
	Measures that are good as is			
1	Forced Air Furnace to heat pump 8.5+ HSPF	3,300	No change	kWh
2	Heat Pump upgrade 8.5 HSPF	1,350	No change	kWh
3	SF showerhead, electric	473	No change	kWh
4	MF Showerhead, electric	336	No change	kWh
5	SF Showerhead, gas	22	No change	Therms
6	MF showerhead, gas	15	No change	Therms
7	SF aerator, electric	134	No change	kWh
8	MF aerator, electric	95	No change	kWh
9	SF aerator, gas	6	No change	Therms
10	MF aerator, gas	4	No change	Therms
11	.62 Efficiency Gas water heater	16.15	No change	Therms
12	SF tankless water heater	102	No change	Therms
13	MF tankless water heater	82	No change	Therms
14	.93 Efficiency 50-gal electric water heater	126	No change	kWh
15	Marathon 50-gal electric water heater	156	No change	kWh
	Measures that need further exploration			
16	SF CFL	75	Further study	kWh
17	MF CFL	63	Further study	kWh
	Measures where Energy Trust should consider revision			
18		91	63	kWh
	MF Gas Hot Water & Dryer	38.6	21	Therms
19	MF Electric Hot Water and Dryer	976	625	kWh
20	SF High efficiency gas furnaces	70.56	110	Therms
21	MF High efficiency gas furnaces	0	40	Therms
22	Manufactured Homes High efficiency gas furnaces	70.56	206	Therms
23	SF Windows, electric heat	564	696	kWh
24	SF Windows, gas heat	44.11	62	Therms
	Measures that could not be reviewed			
25		0.08	Uncertain	therms/sqft
	Attic insulation	0.83	Uncertain	kWh/sqft
26		0.08	Uncertain	therms/sqft
	Floor insulation	1.68	Uncertain	kWh/sqft
27		0.1	Uncertain	therms/sqft
	Wall insulation	1.51	Uncertain	kWh/sqft
28	Manufactured Homes Ducts and Air Sealing (MOBES)	760	Uncertain	kWh
		41	Uncertain	Therms
29	SF HVAC Duct Seal - gas	21.39	Uncertain	Therms
30	SF HVAC Duct Seal - electric	1059	Uncertain	kWh
31	SF Air Seal - gas	25.53	Uncertain	Therms
32	SF Air Seal - electric	766	Uncertain	kWh

Table 2. Summary of deemed and recommended annual savings estimates for all measures.

3.1 Measures that are good as is

For those measures that are in this section, we provide our understanding of the basis of the values for clarity and documentation purposes.

3.1.1 Heat Pumps

This measure is good as provided. Energy Trust documents two distinct types of heat pump savings: conversions of electric forced air furnaces (FAF) to heat pump (HP), and heat pump to heat pump upgrades.

The Home Energy Solutions Program estimates for savings obtained by converting from FAF to HP ranged from 2,700 kWh to 3,900 kWh with a midpoint of 3,300 kWh. This conversion is estimated to generate significant savings since a heat pump with a higher COP is replacing the simple resistance heat.

Energy Trust estimates annual savings for a heat pump to heat pump upgrade at 1,350 kWh based on the billing analysis model for the HES program. This is supported by two Regional Technical Forum studies from 2003 and 2005 which estimated savings of 982 kWh and 1,900 kWh, respectively, for single family homes performing heat pump replacement.

Heat Pumps	ETO Program Savings	
Forced Air Furnace to heat pump	3,300	kWh/year
Heat Pump upgrade	1,350	kWh/year

Table 3. ETO savings estimates from heat pump measure.

3.1.2 Showerheads and aerators

This measure is good as estimated. The showerhead savings are based on assumptions aligned with the 1999 AWWA Residential End Uses of Water Study (Mayer 1999) and updated with the 2006 LBNL Showerhead Savings Study (Biermeyer 2006). The 2000 census of Oregon provides information on the breakdown of single family and multi-family housing units. Many of the assumptions are the same as in the Seattle City Light Showerhead report (SBW 2007). The showerheads assume a 1.1 delta gallons per minute (savings), 2.5 persons per household, 0.5 showers per person per day, with a delta temperature of 52 degrees Fahrenheit. This boils down to 4.5 minutes per person per day, or 11.25 minutes per household per day. The delta flow rates for aerators and showerheads were based on actual field data from 2005-2007 CSG bucket tests.

Table 4 shows the deemed savings for showerheads and aerators for each intersection of water heater fuel type and housing stock.

	Single Family		Multifamily	
	kWh	therms	kWh	therms
Showerhead, electric	473		336	
Showerhead, gas		21.51		15.29
Aerator, electric	134		95	
Aerator, gas		6.10		4.32

Table 4. ETO Engineering estimates of savings for showerheads and aerators, by water heater fuel type and housing stock.

The source of Energy Trust engineering estimates for showerheads and aerators are the most relevant and current information available. Table 5 shows the working savings estimates Energy Trust is using for Program year 2007-2008 based on an adjustment to the previous estimates using an evaluation of the 2003-2005 project year data.

	kWh	therms
Showerhead, electric	195	
Showerhead, gas		9.66
Aerator, electric	88	
Aerator, gas		3.45

Table 5. ETO Working Savings estimates for showerheads and aerators

3.1.3 Water Heaters

The values for this measure appear reasonable, although we did not have information regarding recently updated Energy Trust values. Energy Trusts's program estimate of savings numbers for water heaters are summarized in Table 6. The baseline electric water heater efficiency is 0.86 EF based on the Single-Family Residential Existing Construction Stock Assessment Market Research Report (RLW Analytics 2007). The savings numbers were also calculated using data from the Residential Water Heater Market Research Report prepared by KEMA in 2006.

	Single Family	Multifamily
Tankless	102 therms	82 therms
.61 Efficiency Gas Water Heater	16.15 therms	16.15 therms
.93 Electric water heater (50-gal)	126 kWh	126 kWh
Marathon (50-gal)	156 kWh	156 kWh

Table 6. ETO estimated annual savings per unit for water heaters

The reference documents used for Energy Trust program savings estimates are the most relevant and current documents available. The Energy Trust has revised their estimates for tankless water heaters for the next program cycle. The new savings estimate for

tankless water heaters in single and multifamily dwellings is 65 therms. This revision was based on an in-house analysis by the Trust, and seems to be a reasonable savings estimate to use in the future. However, we were not privy to the calculations behind this revision.

The working savings estimate for program year 2007-2008 for electric water heaters was 68 kWh, based on the 2003-2005 evaluation. This number appears to be a weighted average for all the different types of electric water heaters, but is unclear from the documentation that was provided.

3.2 Measures that need further exploration

3.2.1 CFLs

This measure needs further review. The Home Energy Savings True-Up Analysis for CFLs used savings assumptions based on the results of the 2005-2006 analysis of the Conservation Services Group (CSG) database of Home Energy Reviews. The savings values in Table 7 are weighted averages for all of the breakdowns for type of fuel for heat, etc., before any adjustments for burnout, removal and heating or cooling interactions.

Unit Type	Program Savings estimate before adjustments (kWh)	Hours of operation per day (weighted average)	Hours of operation per day (interior)	Hours of operation per day (Exterior)
SF CFL	75	4.09	4.0	4.8
MF CFL	63	3.45	3.4	6.4

Table 7. ETO estimates of annual savings from CFLs.

These estimated hours of operation are higher than those used in the DEER database and higher than the average of 2.34 hours of operation reported in the 2005 CFL Metering Study conducted by KEMA[2].

In February 2009 San Diego Gas & Electric published "Report for the CFL Energy Impact Study"[3] which found the heat interaction penalty from replacing incandescent bulbs with CFLs to not be statistically significant. However, this report was based on data from low income housing in the San Diego region. Due to the dominance of heating in the Oregon region, this interaction could be more significant in the territory served by Energy Trust. Given the lack of reliable study estimates on the heating penalty, we recommend the Trust conduct further study on the accuracy of the heating penalty factor.

[2] The 2.34 average includes outdoor CFLs. When only indoor CFLs are considered, the average is 2.28 hours. KEMA Inc. "CFL Metering Study". Submitted to PG&E, SDG&E and SCE, February 2005. http://www.calmac.org

[3] Available at http://www.calmac.org/publications/Appendix_C_-_CFL_Interactive_(2).pdf

3.3 Measures that Energy Trust should consider revising

3.3.1 Commercial Clothes Washer and Dryer

Our original review of this measure indicated that Energy Trust's value appeared too high for the reasons discussed below. Since we reviewed this measure, Energy Trust has updated the value to one that is more in line with our original review. However, for purposes of tracking the reasons for our recommendation, we provide the complete review next.

Energy Trust calculated savings for the commercial clothes washer measure (used within the multi-family sector) using the online Maytag calculator.[4] The values sum the energy savings from the washer, dryer, and avoided hot water costs. Energy Trust performed extensive calculations to separate the savings from avoided hot water use from the savings due to the overall efficiency of the hot water supply and washing system. The savings for an efficient washing machine is 0.869 kWh/cycle. The analysis assumed that each unit was used 3 times per day, which is very close to the ENERGY STAR assumption that commercial washers are used 18.3 times per week. Energy Trust;s calculation considers all machines with a MEF $\geq$ 2.0 to be efficient. ENERGY STAR uses an MEF $\geq$ 1.8 as the level at which clothes washers are considered efficient. Table 8 shows the ETO savings estimates next to the ENERGY STAR savings estimates for clothes washers with gas and electric water heaters.

The components of the current savings calculations that were originally provided to us are shown in Table 8. .The 91 kWh of savings for a clothes washer with gas hot water and results from the sum of 66.7 kWh of savings from the more efficient washer and 24.3 kWh of savings from avoided water and waste water usage. The dryer and hot water also contribute 38.6 therms of savings. The savings for the electric hot water and dryer includes an additional savings of 473.6 kWh from the dryer and 411.4 kWh from reduced hot water usage. The dryer savings is based on reduced drying time with a standard dryer due to the superior spin cycle of the efficient washer.

	ENERGY STAR Recommended savings (kWh)	ETO Annual Unit savings (kWh)	Washer (kWh)	Dryer (therms or kWh)	Hot Water (therms or kWh)	Water / Wst Wtr Energy Savings
Gas Hot Water and Dryer	63	91[3]	66.7	*19.9*	*18.7*	24.3
Electric Hot Water and Dryer	625	976[4]	66.7	473.6	411.4	24.3

Table 8. ETO program estimates for commercial clothes washers.

[4] Available at http://www.macgray.com/eissues/calculator.html

ENERGY STAR has a savings calculator available online, that could be used instead of the Maytag calculator. The DOE ENERGY STAR calculator provides a unbiased source versus a manufactures calculator. The recommended savings are based on per-unit savings as modeled in the ENERGY STAR calculator, which does not provide estimates for dryer or waste-water savings. Also here are values that Energy Trust updated as of May 2009, which appear to be much more in-line with the ENERGY STAR values.

	ENERGY STAR Recommended savings (kWh)	ENERGY STAR Recommended savings (therms)	ETO Updated (08-09) Annual Unit savings (kWh)	ETO Updated (08-09) Annual Unit savings (therms)
Gas Hot Water and Dryer	63	21	69	38.6
Electric Hot Water and Dryer	625	NA	543	NA

Table 9. Recommended washer savings and Updated ETO program savings

3.3.2 Gas Furnaces

We cannot make a judgment on this measure. Energy Trust's furnace measure life was based on the 2005 Natural Gas Furnace Market Assessment by Habart & Associates. This document indicated that old furnaces were more than 25 years old when removed. The furnace savings estimates are from an internal program evaluation and apply to single family and manufactured homes only.

The 2003 Ecotope – Natural Gas Efficiency and Conservation Measures Assessment provides engineering estimates of savings from putting in new high efficiency furnaces (where efficiency is greater than 0.90). This report was commissioned by Energy Trust Oregon, and thus these estimates cover the relevant territory. Single family potential for savings was described as 110 therms /unit, multifamily was 40 therms/unit and manufactured homes savings was estimated at 206 therms/unit annually.

	ETO Program savings estimate (therms)	Possible engineering estimates (therms)[5]
Single Family High efficiency gas furnaces	70.56	110
Manufactured Homes High efficiency gas furnaces	70.56	206

[5] Baylon, et al.

Multifamily high efficiency gas furnace (per multifamily unit)	Not provided	40

Table 10. Gas furnace savings estimates.

The HES program used the 2003-2005 evaluation of field data to adjust their energy savings estimates for the 2007-2008 program year cycle. Because of our inability to review the adjustments made to create Energy Trust's values, we cannot make a recommendation of those values versus the information found in the Ecotope report.

3.3.3 Windows

HMG was unable to assess the assumptions involved in the adjustment from evaluation. Program estimates provided by Energy Trust for program year 2007-2008 are summarized in Table 11 below. These numbers are the result of adjustments based on the evaluation of the 2003-2005 program years. These savings reflect upgrading to a window with a U-factor of 0.30 or less.

Single Family Windows	ETO Annual Savings Estimates	ResFen Savings Estimates
electric heat	564 kWh	696 kWh
gas heat	44 therms	62 therms

Table 11. ETO program savings estimate for windows for program year 2007-2008.

The calculation behind these savings estimates were not made available for review. The search for better estimates resulted in the use of ResFen, a tool developed by the Lawrence Berkeley National Laboratory to model savings from upgrading to different windows depending on U-factor, solar heat gain, location, etc. We generated savings estimated through ResFen using the following assumptions:

- Efficient Windows Collaborative's Oregon model assumptions for housing and window characteristics: whole house assuming 300 sq ft of windows in a 2000 sq ft house
- Base case window characteristics based on Oregon residential code
- Efficient window characteristics based on program criteria

The ResFen values are higher than Energy Trust savings but are ones that Trust may want to consider solely due to the ability to document specifically the information behind the value.

3.4 Measures that could not be reviewed

3.4.1 Insulation

There are two different (but similar) values for this measure. We cannot ascertain which is the better value. The program savings from insulation were refined for the HES 2007 program year using Conservation Services Group (CSG) program data collected from installations in the field. Matt Braman explicitly identified Table 12 as the working estimates for Energy Trust.

	sqft	therms	therms/sqft	sqft	kWh	kwh/sqft
Attic Insulation	1,147	94	0.08	1,044	865	0.83
Floor Insulation	1,084	88	0.08	1,489	2,494	1.68
Wall Insulation	941	89	0.10	903	1,362	1.51

Table 12. ETO Program estimate of annual insulation savings in manufactured homes.

The values in Table 13 come from a document the Trust provided for review. It included the working estimate from program year 2003-2005 and subsequent adjustment from the evaluation of those years used to obtain the working savings for 2007-2008, which are summarized in the table below.

	therms	kWh
Attic Insulation	51	858
Floor Insulation	63	1268
Wall Insulation	65	1075

Table 13. Working Savings for program year 2007-2008

It is unclear as to which values are the appropriate savings estimates to be reviewed. As savings for insulation are generally reported in terms of square feet, Table 12 may contain the more appropriate program savings estimates.

3.4.2 Manufactured Homes Ducts and Air Sealing (MOBES)

HMG was unable to assess the assumptions involved in the adjustment from evaluation. As we understand it, the Manufactured Homes Ducts and Air Sealing (MOBES) measure estimated savings were revised at the end of 2006 using CSG program data. The initial calculations were revised with more accurate participation rates for the different categories. The adjusted total weighted average savings for the overall program are 760 kWh and 41 therms. Data from program year 2003-2005 were adjusted based on the program evaluation of those same years for the 2007-2008 program cycle working savings estimates. This is the most accurate data available for this specific measure and region.

3.4.3 Duct and Air Sealing

We cannot make a judgment on this measure. The documentation of the source of savings estimates for duct and air sealing is spotty. According to a document summarizing the history of duct sealing savings estimation, it appears that the engineering estimate for single family annual savings from duct sealing was 1,556 kWh based on the Regional Technical Forum 2003 report. Anticipated evaluation factors revised the savings estimate down to 1,126 kWh. During a phone call with Matt Braman on April 24, 2009 he indicated that the savings estimates being used by Energy Trust are summarized in Table 14.

Single Family	Gas (therms)	Electric (kWh)
Duct Seal Only	21	766
Air Seal Only	26	1,059

Table 14. ETO savings estimate of duct and air sealing in single family homes

Duct sealing appears to be provided 2003 Ecotope Natural Gas Efficiency and Conservation Measures Assessment[6] and the Ecotope Energy Efficiency Conservation Resource Assessment[7] for recommended savings estimates. The report provides a documented source of energy savings potential per measures developed for the Trust. However, the per unit savings were only available in the accompanying "Resource Assessment tool" which did not have access too. It is not certain how the program savings estimate was determined following the publication of this report. Because of the uncertain reasons for the current values, we cannot make a recommendation of those values versus the information found in the Ecotope report.

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