Savings beyond ENERGY STAR® with Energy Performance Scores

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ABSTRACT

In 2008, residential energy efficiency code changes in Oregon required Energy Trust of Oregon to update the design of their new construction program. As reported at the 2008 Summer Study, Energy Trust launched and structured a program around the new Energy Performance Score. The program also added permit outreach and design phase assistance. The switch from a prescriptive path tied to a single certification system (e.g., ENERGY STAR) to an upstream modeling approach that works with all certifications (e.g., NAHB Green, Earth Advantage, LEED) allowed Energy Trust to provide incentives to builders on a sliding scale, claim actual rather than deemed savings, and offer flexibility and recognition to all homes built better than code requires.

During restructuring, the program made the assumption that builders would build to levels below ENERGY STAR certification in the first years due to the significant increase in requirements. However, within the first six months, the program was pleasantly surprised to see that builders had embraced the new program design and were improving the levels of efficiency over 15% above the deemed ENERGY STAR levels. Additionally, even in a historic downturn in the building market, the program is seeing a market penetration rate of 16% the first year after a code change.

This paper will provide other implementing organizations a fundamental design they can use for a non-ENERGY STAR based new construction program. It will also include lessons learned as well as provide an evaluation of the unexpected increase in energy savings.

Introduction

In the Northwest, the Northwest Energy Efficiency Alliance (NEEA) is a non-profit organization working to encourage the development and adoption of energy-efficient products and services working across the four northwestern states (Oregon, Washington, Idaho and Montana). NEEA is supported by the region's electric utilities, public benefits administrators, state governments, public interest groups and efficiency industry representatives including Energy Trust of Oregon. NEEA works directly with the EPA and DOE to set the ENERGY STAR requirements for the northwest region. Rather than using a modeling methodology as is common in the rest of the US, it was decided to develop prescriptive paths called Builder Option Packages (BOP's) for builders to more easily follow to go 15% beyond building codes and certifying homes as ENERGY STAR.

Energy Trust of Oregon is a non profit organization that administers public purpose funds in Oregon for energy efficiency and renewable energy generation, serving approximately 86% of all Oregonians. Portland Energy Conservation, Inc. (PECI) is contracted to implement the program and partners with Earth Advantage Institute (EAI) and Conservation Services Group (CSG) to deliver the program. Energy Trust adopted NEEA's Northwest ENERGY STAR for Homes standard as their residential new construction program in 2004 to create a cohesive

Northwest effort. Through the ENERGY STAR program, Energy Trust developed deemed average savings the program could claim for every home built under the auspices of the program as well as cash incentives builders would receive to help offset the cost of building to higher efficiency levels as well as help pay for verification of the prescriptive measures built into or installed in the homes. Over the course of four years of outreach and marketing to builders and potential home buyers the program reached a 12% market share.

This work by the program to promote energy efficiency and adoption of ENERGY STAR by Oregon builders convinced the state to increase the level of energy efficiency that is part of the Oregon residential building code. While the program was excited to create market transformation in the residential new construction market, we were aware that the outcome of the State's work in raising the efficiency code would result in a program redesign and an increased ENERGY STAR standard.

Background

On July 1, 2008 the Oregon Dept. of Energy updated the energy portion of the Oregon residential building code to make it approximately 15% more efficient than the existing code. This required NEEA to increase the prescriptive path of the Northwest ENERGY STAR certification to become 15% higher than the new code levels. The new ENERGY STAR standard in Oregon was equivalent to the Federal Residential Efficiency Tax Credit standard.

Responding to Market Changes

As part of the change in ENERGY STAR requirements the program polled participating builders to determine their reaction to the new program requirements. Oregon builders responded that the new prescriptive path was too restrictive and potentially expensive given the downturn in the housing market and economy. Even with increased incentives and marketing, the response we received back from builders was that they would no longer participate in the program and were not willing to build to the new ENERGY STAR standards. With the housing market starting an unprecedented spiral downward and builders reporting unwillingness to participate, Energy Trust was very concerned about losing all of the work that went in to cultivating a large cadre of builders, subcontractors and other residential new construction trade allies. The new construction program team decided that a new program design was needed to continue the relationships that the program had worked so hard to cultivate.

New Program Design

The resulting new program design included a platform in which builders could collect incentives and receive building science consultation from the program for any home built more efficient than Oregon code required. The tool to promote this platform to builders and consumers became the Energy Performance Score (EPS), which was designed to function like a miles per gallon (MPG) sticker for your car. The EPS provides a visual representation of the energy consumption of a home compared to if it had been built to code standards. The EPS also provides builders, as well as potential home buyers the average associated energy costs with operating that home. The EPS provides multiple benefits to builders, consumers and the program as described

in the section below. The EPS also provides representation of the carbon score (footprint) of that home which is based solely on the modeled energy consumption.

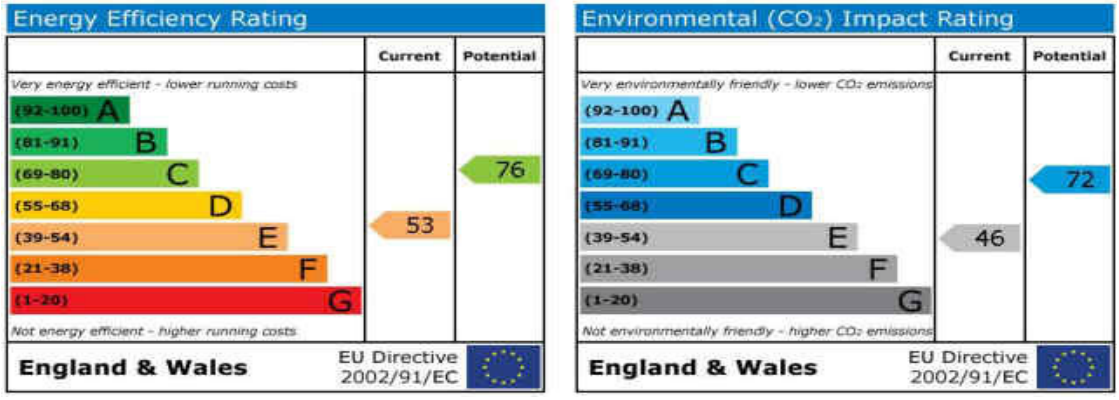
Benefits of this new program design to Energy Trust included:

- Providing modeled savings rather than deemed (average) savings to claim for each individual home constructed in the program so that Energy Trust is claiming actual savings for the efficiency measures being done;
- Providing Energy Trust branding to homeowners and builders, as opposed to just a 3rd party label as was the case with ENERGY STAR;
- Providing a follow-up marketing conduit back to the homeowner through homeowner on-line registration of the home so that the program can create a continuing relationship with the homeowner to help the persistence of savings; and
- Allowing a continuing relationship with builders who want to participate in the program but may not want to build to ENERGY STAR levels or who may be building beyond ENERGY STAR levels and who want additional recognition.
- Providing homeowner education about energy use, carbon footprint, and energy costs in new construction homes, done in an easily understood visual format like a "MPG" for your home.

Program Design

During 2008, Earth Advantage Inc. (EAI) brought to the program team a concept for a home energy performance certificate which had recently been mandated in the United Kingdom as a point of sale methodology to better educate perspective home buyers of the level (or lack of) energy efficiency built into homes (see figure #1). Through several brainstorming sessions, the team developed a concept that took the Energy Performance Certificate and redesigned it for Energy Trust's new construction program. This became a scalable solution that allowed program builders to participate at the level that was most comfortable for them and then once participating, allowed the program to pull them up the efficiency scale building higher levels of efficiency into their homes. And since builders would not be locked into a prescriptive BOP, they could experiment to find the combination of efficiency measures that worked best for them, and the program could claim corresponding savings and pay cost effective levels of incentives for the savings. Energy Trust agreed to the concept and the program team started to design.

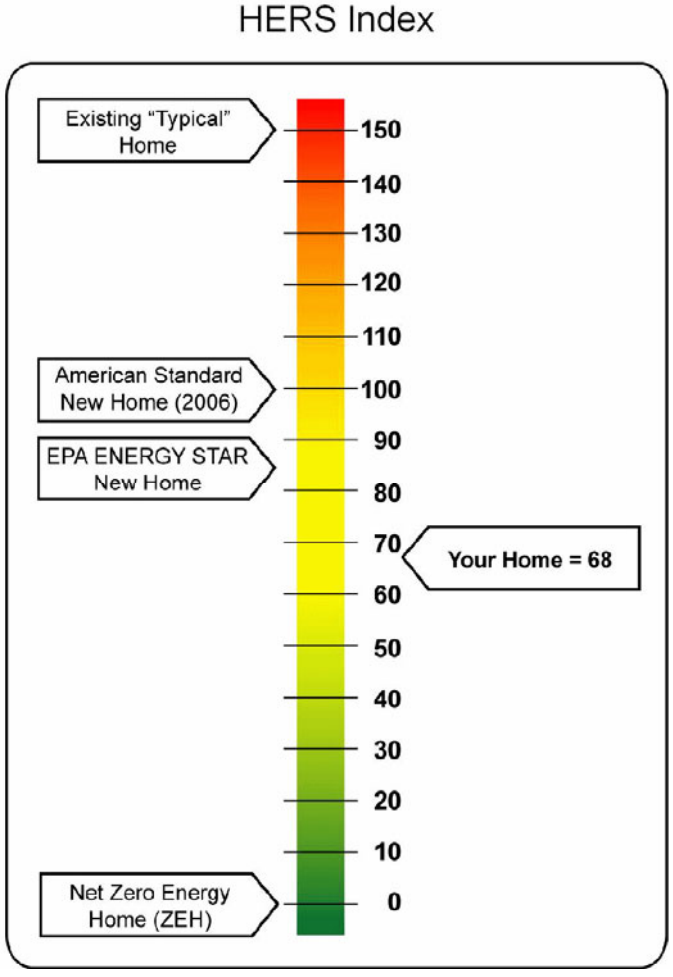
Figure 1. UK Energy Efficiency Rating Label



Current Market Trends

The program started by looking at other scales currently in the market to see if there was one that met the program's requirements. The most widely used scale in residential energy efficiency is the HERS scale (see figure #2) which provides an efficiency number based on the level of energy efficiency built into the structure. While the program appreciated the simplicity of the HERS scale as well as its adoption in the market, it had a few shortcomings that the program wanted to address. First is that it speaks solely to the efficiency of the home and not the energy savings that are realized from that efficiency. This is important to the program because while a 1200 sq ft home and 5,000 sq ft home could both have a HERS score of 60, the actual amount of energy used in each home is vastly different. As a comparison tool when shopping for a home, or for a homeowner trying to fully understand their energy use, the HERS score was not helpful.

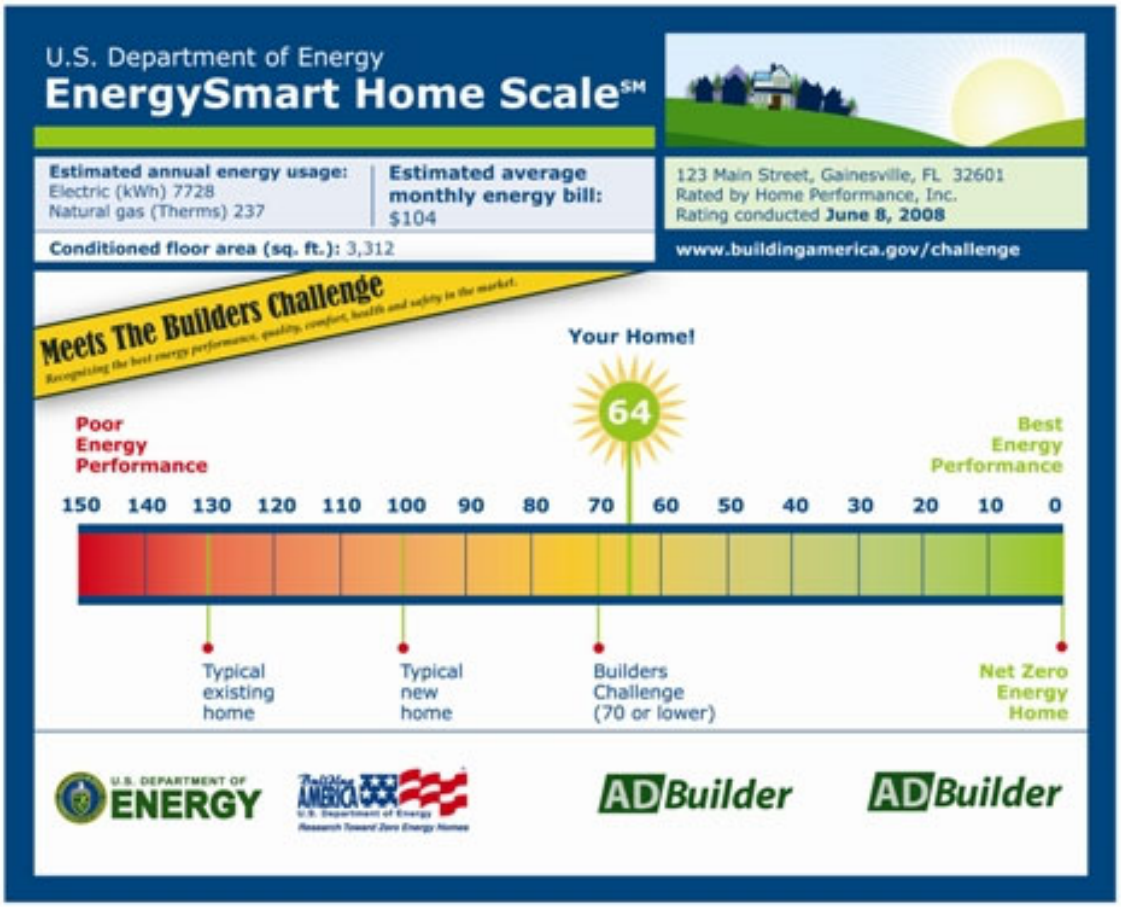
Figure 2. The Home Energy Rating Scale label



The program also looked at DOE's EnergySmart Home Scale (see figure #3). It too used the HERS number as the score plus it did not have a key component that the program was considering, which was a carbon footprint. The carbon component was important to the program to educate consumers of the link between carbon emissions and the energy generated to operate a

home. At the time, DOE was not open to modifying their scale to make it more specific to the needs of Energy Trust.

Figure 3. US DOE's EnergySmart Home Scale Label



Meeting Oregon's Needs

Given what was currently available on the market, the program decided to develop our own scale that reflected the actual energy use of a building, the building's carbon footprint and the energy costs to operate the home. As we developed the scale, we needed to keep the following requirements in mind: A scale applicable to electric and gas utilities, the ability to calculate energy savings for the home for program claims, the ability to use commonly available modeling software and it had to be easy to read and understand.

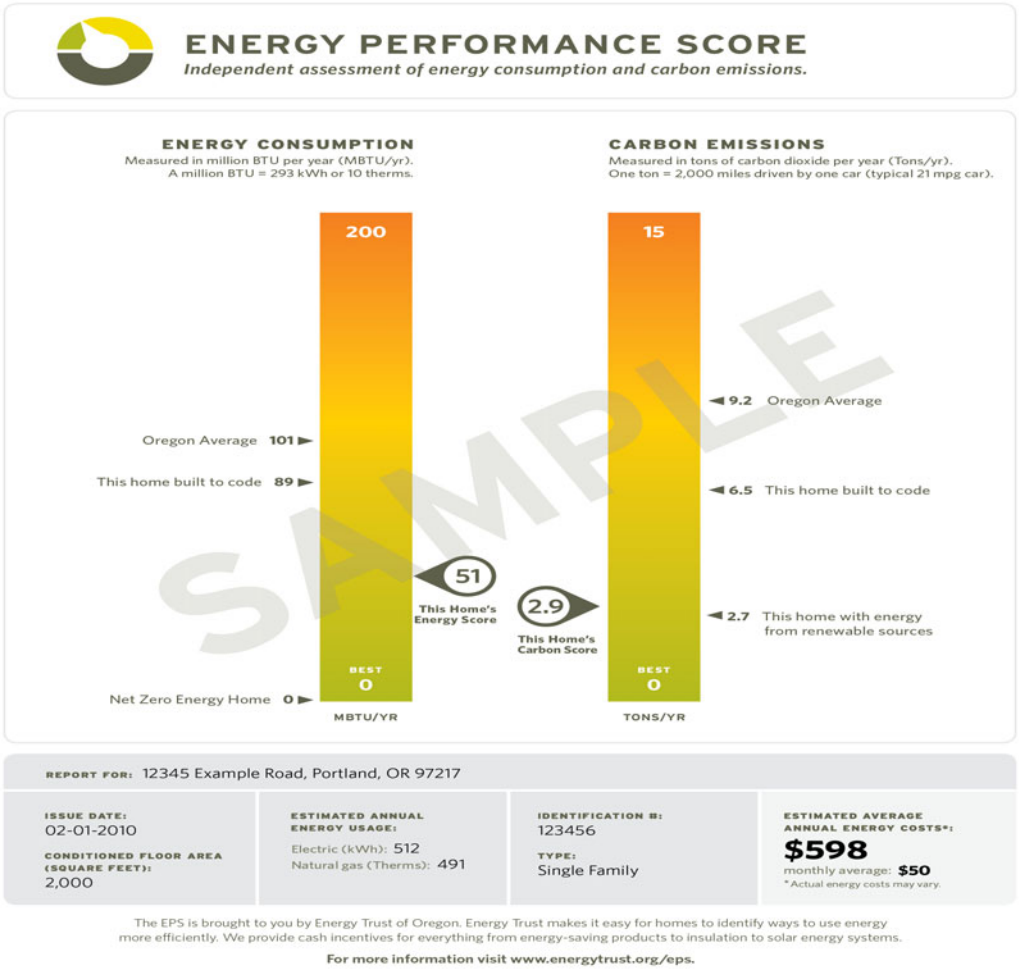
Since Energy Trust would be claiming energy savings from the program, first step was to look for easily available modeling software that provided the program with reliable energy savings a usage that matched up to existing deemed savings already accepted. The program chose to use REM/Rate as the modeling software and then developed our own proprietary on-line calculator that took the REM/Rate output and created defendable savings claims based on improvement over code. The calculator also provides incentive amounts based on accepted cost effectiveness targets mandated by Energy Trust. This combination of modeling software and calculator were vetted by Energy Trust and the Northwest's Regional Technical Forum (RTF).

Design Phase

The program then designed the actual score sheet keeping in mind that the certificate needed to appeal to consumers, builders and realtors, allowing them to clearly understand the information being presented (see figure #4). The program also wanted to provide relevant information to homeowners such as the estimated yearly average energy usage and the average monthly energy cost. We also wanted a format that provided a simple layout that is both attractive from a design standpoint but also had a look of "officialness". The certificate includes specific information about the home and contains customized estimated energy use and estimated monthly energy costs since these are important metrics to potential homeowners.

Throughout the process, the program relied on focus groups and surveys to help guide the design of the score sheet in such a manner that it fulfilled the programs goals. The score sheet is very clear that the information regarding energy use and billing amounts are based on modeling and that their actual use and costs will vary. The certificate also provides information on the organization that rated the home to verify the energy score, providing a level of confidence for homeowners that there is rigor applied to the scores and the home.

Figure 4. Energy Trust of Oregon's EPS label



Builder Rollout

Once completed, the program's first steps was to introduce it to builders and provide the necessary education regarding program design, new scaled incentive structure, education on the application of the EPS, how to use it to market homes and educate potential home buyers. In introducing it to builders, the program is using a very direct approach—the offer of financial incentives for building homes more efficient than code. Throughout the introduction of the EPS to builders, the program was very clear in our messaging that this was not a new program but instead an upgrade to the existing program that allowed builders more freedom as to how they built for energy efficiency as well as the increased incentives that were available to them. We also were very clear with builders that ENERGY STAR as well as all other green and energy efficiency certifications available in Oregon such as Earth Advantage, LEED and NAHB Green were still recognized by the program and would be validated by the EPS.

Consumer Launch

After program builders were educated about the EPS, the program turned our attention to consumers due to the fact that consumer demand is the impetus that, more than anything else, will push the EPS into the forefront of the new construction market. The EPS is marketed as a decision tool used by the educated home buyer when shopping for a home. By marketing the EPS to consumers and creating a consumer demand, where consumers are asking builders and Realtors what the EPS of a home is, we bring the EPS to the decision making process both of the home buyer, but also the home builder. Increasing consumer demand has created yet another reason for builders to join the program and build more homes to higher energy efficiency standards, creating even more energy savings throughout the state of Oregon.

Industry Stakeholder Introduction

Another group of industry participants the program is contacting is the Realtor, mortgage and appraiser markets. The program provides no cost trainings to these groups in order to create a value for the Energy Performance Score. By creating a value that appraisers understand, the program hopes that energy efficiency measures and EPS will cause appraisers to increase the appraised value of the home. To date, the trainings have been very well attended by all groups who have shown a keen interest in learning more about "green" and "eco" homes. By increasing the appraised value of the home it creates more value to builders for the energy efficient measures.

Promoting the EPS to Realtors allows that group to have yet another selling benefit of the home. For Realtors the EPS allows them to promote the energy efficiency of a home and show how a home is more efficient than competing homes. In the current real estate market, Realtors are looking for any edge in selling homes and have found the EPS to be a selling tool that can be used to make their homes more desirable than other homes. In 2010, the program hopes to have EPS scores listed for homes on the Multiple Listings web site that both Realtors and home buyers use.

Market Acceptance

The program rolled out the EPS to the builder market in June of 2009, at first introducing it to builders who were already participating in the program and those we felt would be most open to the program enhancements. Through a combination of builder education classes, provided through the local area Home Builder Associations (HBAs) and direct one on one interaction with program outreach staff the program was able to provide education to almost 200 program builders. Most program builders readily understood the concept of MPG for their home and were very excited about the ability of the EPS to provide average monthly operating costs for homes, something that they had not been able to do prior to the EPS.

In addition, builders also appreciated the new program concept of a scaled approach and incentives. The ability to receive more incentives for building higher levels of efficiency appealed to builders and they immediately started asking the builder outreach staff for ideas on cost effective upgrades to improve the efficiencies of their homes. Builders engaged more with the program, finding the solutions that most appealed to them and their prospective home buyers. This is one of the major differences from the Northwest's ENERGY STAR program, having a scaled approach instead of a "one size fits all" certification, as seen in program results detailed below.

Once the program had rolled out the EPS to existing program builders and received positive feedback we started to promote it to all Oregon builders. Through a combination of articles written for local HBA newspapers and newsletters, providing additional trainings and educational sessions at HBA's along with sponsorship of home tours in Oregon, the program reached out to builders not already in the program. As well, the program developed relationships with all of the county permitting offices in Oregon and was able to access all building permits pulled on a weekly basis. These permits then were fed to an experienced program staffer who has a building background and this person began calling all permit holders on a regular basis. This staff person was able to introduce the program to active builders that were new to the program and was able to answer questions prior to passing them off to program outreach staff. This strategy was the most effective for promoting the program to builders not currently participating, resulting in 4% of permits turning into qualified leads.

Program Results

As the Energy Performance Score and new program design started gaining traction in the Oregon marketplace, more and more builders started adopting the EPS for their homes. In the six months following the launch of the EPS, the program saw an upswing in the number of builders participating in the program, and this during a market that had seen a decrease in permits issued by over 42%. In the last six months of 2009, the program issued almost 300 Energy Performance Scores on houses, ranging from a low of 23 (an excellent score) to a high of 191 on a "McMansion". But even with a score as high as that, the builder was still able to show how much better the home was than if it had been built to code as his competitors built their homes.

Builder Feedback

Based on initial builder feedback as well as results of focus groups, the program assumed that builders would promote their homes based on the score the home received. While builders did indeed post Energy Performance Scores and talk about how much better the score was than if the home had been built to code, they were even more excited about the monthly average cost to operate the home. This was the first time that a builder could actually quantify the cost to operate a newly constructed home since they did not have the history that existing homes have. Based on this new information many builders started to use the average monthly operating cost as a top selling tool in marketing their homes which came as a surprise to program staff.

Efficiency Improvements

As more builders started to participate in the program and build homes receiving Energy Performance Scores, the program experienced a phenomenon that was completely unexpected. The program assumed that the majority of builders would build to energy efficiency levels below the 15% above code that ENERGY STAR required, implementing some energy efficiency measures and receiving commensurate incentives though not achieving the full 15%. Surprisingly to the program, what actually occurred were builders were reaching beyond ENERGY STAR and implementing energy efficiency measures that were not part of the ENERGY STAR prescriptive paths but rather ones that worked best for them and being rewarded for going beyond ENERGY STAR certification. These builders and paths ended up driving average home savings 15% higher than ENERGY STAR allowing builders to receive higher incentives and better Energy Performance Scores.

Interestingly, 90% of the homes that received an Energy Performance Score also received certification from a green program like Earth Advantage (that has ENERGY STAR inside) or LEED. Energy Trust's program sees a high coincidence rate of green certified homes because program outreach is performed by Earth Advantage Institute staff. The alignment with green benefited the program in two ways. It helped maintain and grown market share because green homes were continuing to sell despite the downturn in the market. The program also benefited from a receptive audience as the green builders were eager to have a score that validated the energy claims they were making about their buildings. The Energy Performance Score is designed to work with any third party certification and it makes it a natural fit with other green certification programs offered.

Market Penetration

With the implementation of the Energy Performance Score, the program has seen market penetration (as measured by % of permit applicants participating in the program) increase by 25% (from 12% to 15%) and average per home energy savings at 15% above ENERGY STAR equivalents. Some of this increase can be attributed to the scaled incentives, allowing builders to collect increased incentives for increased levels of energy efficiency. However, in discussion with builders, the program has received overwhelming feedback that the Energy Performance Score is a very strong driver in pushing builders to build beyond ENERGY STAR standards.

Conclusion

As the EPA implements even higher requirements for ENERGY STAR and the Oregon Department of Energy increases residential efficiency levels in code again in 2011, the program is well positioned to use the Energy Performance Score to continue relationships with builders the program has spent years developing. It will allow the program to keep builders in the program who are building homes more efficient than code requires, and pushing the efficiency level beyond even ENERGY STAR efficiency requirements. As well, by engaging Realtors, appraisers and mortgage companies to recognize and use the EPS in their value proposition for homes it creates additional value propositions for builders and homeowners alike. These values associated with the EPS drive more and more builders to want to have Energy Performance Scores for their homes.

EPS Beyond Oregon

Other programs have the opportunity to look at re-examining their programs with the onset of new ENERGY STAR standards. We strongly recommend polling builders to judge just how many builders will still participate at the new levels. The EPA has gone on record stating that they expect to drop back to 15% market share of homes built certified with the new requirements (from close to 70% currently). The EPA should be commended for its great leap forward for energy efficiency in the new residential construction market as the new specifications are indeed the best practices for new construction. However, ENERGY STAR goals are unfortunately falling out of alignment with utility program goals which are to get as much cost effective energy savings as possible.

By implementing a program that is out of reach of most builders, many utilities and their program implementers will fail to reach residential new construction energy efficiency goals. The benefit of implementing the Energy Performance Score is that programs can embrace a multitude of new construction certifications while continuing their relationships with program builders, supporting their moves to green building and energy efficiency best practices. More and more, builders are looking beyond energy efficiency and building to green certifications since green is appealing to consumers. The EPS supports green building and quantifies the energy efficiency portion for utilities to claim energy savings. And as green building programs continue to morph with the latest knowledge and technologies, the EPS supports those changes, without having to re-design the program.

By starting the process now, programs can develop an Energy Performance Score program foundation: choosing modeling software, developing savings and incentive calculations, developing a score sheet, and integrating the EPS with existing new construction programs. By spending several months setting this foundation, programs will be ready to roll out revisions to builders, raters, subcontractors, Realtors and home buyers in time to counteract any potential difficulties that the new version of ENERGY STAR will bring. It is the design and implementation of this foundation that will create a seamless transition for a program participant. This also can allow program implementers to align with other green programs in the marketplace and validate their energy savings claims.

As the new ENERGY STAR requirements are finalized and implemented by the EPA for 2011, many programs throughout the United States have worried and publicly voiced their concerns about loosing builders from their programs due to the high level of requirements. By

implementing an Energy Performance Score style program similar to what Energy Trust has implemented allows programs to negate the “all or nothing” strategy that EPA is implementing with these increased ENERGY STAR standards. An EPS tool allows programs to continue the hard earned relationships they have developed with builders, subcontractors and raters and keep them in their programs, all the while encouraging the construction of homes that are more efficient than code and contributing to ever-growing energy savings goals.