Boosting residential retrofit rates using a centralized energy labeling infrastructure

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Abstract

A multi-faceted and modular energy labeling program was proposed to the cities of Seattle and Bellingham, Washington, to increase the rate of residential retrofits. The proposals were funded and launched as scalable pilot programs using American Recovery and Reinvestment Act (ARRA) monies. The Seattle program has targeted energy labeling and retrofitting for 5,000 existing homes, and the Bellingham program has targeted 1,200 existing homes. The programs offer an integrated "one-stop" approach for homeowners, and the option of three scalable elements: auditor training on the Energy Performance Score (EPS) software; education of real estate professionals about energy efficiency and the benefits of energy labeling; and a centralized delivery system for homeowners that allows them to access their EPS scores, auditor upgrade recommendations, and competitive bids from energy contractors and lenders. While audits and retrofit efforts in these pilots are still ongoing, Bellingham results point to a strong conversion rate. Data on energy upgrades from Seattle are not yet available, although the audit rate is high at 150 homes per month.

Introduction

According to the Pew Center's Agenda for Climate Action, greenhouse gas (GHG) emissions can be addressed in part through labeling and standards for buildings, focusing on those standards that would result in significant GHG reductions through reduced energy use. Standards and labeling can help overcome energy literacy obstacles, increasing consumer interest in building efficiency and spurring the retrofit market.

With the recent availability of ARRA dollars from the federal government, many U.S. cities are deploying residential energy audit retrofit programs, but the rate of market penetration – from audited home to implementation of energy upgrades – has historically been low due to insufficient education of the homeowner, inadequate messaging, and cost barriers. Merrian Fuller (2008) estimates that retrofit market penetration is 0.5 percent annually.

This paper will discuss partial results of large ongoing energy labeling pilots conducted by Earth Advantage Institute (EAI). The pilots, targeting 5,000 homes in Seattle, Washington, and 1,200 homes in Bellingham, Washington, are designed to increase residential retrofit rates. Both programs seek to create a modular but scalable infrastructure for municipalities to engage homeowners using a centralized information delivery process and a tested energy label called the Energy Performance Score (EPS). Through the deployment of this effort EAI hopes to introduce fundamental and permanent transformation of retrofit markets across all sectors of the economy.

The EPS was developed by EAI with funding from Energy Trust of Oregon and provides homeowners with clear, accessible information on the energy performance of their homes. The EPS allows homeowners to learn how efficiently their homes are performing in both energy consumption and associated carbon impact. The EPS software tool produces an EPS Score Card that graphically displays a home's annual energy usage (in kWh/yr) and carbon emissions (pounds of carbon dioxide equivalent – CO_2e). Both scales have base values of zero, which correspond to Net-Zero Energy consumption or Net-Zero Carbon emissions.

EAI's strategy is holistic and addresses a multitude of needs for sustainable market transformation: educating the homeowner on the performance of homes, developing and supporting retrofit businesses, introducing a trained workforce to the sector, and offering the EPS as a market mechanism to support the energy efficiency economy.

Through both programs homeowners take advantage of "one-stop shopping" that makes the audit and upgrade process easy for them to understand, schedule, and pay for. In the case of Seattle this is accomplished through a web portal, where homeowners see specific information on their home audit, comparisons of energy upgrade bids, and proposed financing information. The Web-based approach is complemented by training of auditors on the EPS software and procedures, and by education of real estate professionals and appraisers as key "agents of transformation."

It should be noted that at this time the Seattle program is still in the early stages of implementation, pending the late integration of an on-bill financing program called CommunityPowerWorks, which will offer homeowners the option of on-bill loan repayment for retrofit work.

The Bellingham program has chosen to deploy auditor training and a team of consumer-facing energy advisors as the centralization mechanism. Homeowners will not have access to a web information portal. The city also declined to undertake education of real estate professionals.

Initial results from the Bellingham project show that of the 330 homes audited to date, 150 homes have completed or commenced energy upgrades, a conversion rate of 45 percent. Initial results for Seattle have not yet been tallied due to ongoing negotiations with CommunityPowerWorks. It will be interesting to compare the two programs' rates of success in engaging homeowners via different approaches.

This paper will provide a look at the following aspects of program efforts:

- Previous general residential retrofit rates
- Requirements for a successful retrofit program
- The role of the EPS as a market mechanism and metric at the heart of a business "ecosystem"
- EPS history and description
- EPS general program infrastructure
- The Seattle EPS program structure
- The Bellingham EPS program structure
- Program results for each city
- Conclusions

Residential Retrofit Rates: A Poor Showing

Homeowner interest in government and utility subsidized energy efficiency audits has been high. The first phase of a 2009 Portland, Oregon on-bill financing pilot called Clean Energy Works program was oversubscribed. The program is now expanding statewide. Similarly, the first California PACE pilots were successful, with over 30 million Euros in funding requests from Sonoma County alone (Elkind 2010). In Missouri, more than 300 retrofitting requests were generated in 30 days by a public-private consortium, with "virtually no marketing." (University of Central Missouri 2010).

Despite the interest, getting a broader base of homeowners to move past the energy audit to actually undertake energy upgrades has proven to be an elusive goal. Recent programs in Pennsylvania, New York State, Massachusetts and Washington D.C. were able to attain upgrade rates of only 0.15 %, 0.6 %, 0.9 % and 0.8 % respectively, despite assessment rates of between 22 to 70 percent of total eligible homes (Fuller 2010). Other programs such as Portland's Clean Energy Works had higher conversion rates during their pilots but the initial methodology was to "cherry pick" the better prospects from a host of applicants and through targeted outreach to appropriate neighborhoods (EnergyTrust of Oregon 2010).

Ethan Elkind (2010), in his policy paper summarizing retrofit workshop results at Berkeley Law School, identifies four barriers that typically prevent single-family homeowners from moving forward with energy upgrades. These include:

1. Lack of awareness of retrofit potential. Many homeowners are unaware of the energy inefficiencies in their properties and the opportunities for long-term savings through retrofits.
2. Lack of available financing and long payback periods. Homeowners are often unaware of financing opportunities or have limited resources, and can't afford larger up front payments, even for longer term payback.
3. The audit and retrofit process is inconvenient and complicated. Choosing an auditor and energy contractor can be daunting, as well as deciding what retrofit measures to use, where to find financing and dealing with the disruption during retrofitting.
4. Lack of a trained and qualified retrofit workforce. Homeowners may be concerned about the level of skill offered by the energy contractor.

Recent retrofit programs have attempted to address some of these concerns in a piecemeal fashion. The deployment of the aforementioned Oregon and California PACE-style financing programs, the institution of straight rebates and tax credits such as those offered by the Energy Trust of Oregon (Energy Trust of Oregon web site); special programs focusing on direct install, appliance turn-in, and education offered on a large scale by most California utilities (Fogel 2009); major consumer marketing campaigns by utilities and states; and efforts to strengthen state energy contractor licensing standards such as the 2010 U.S. Senate Bill 3663 have all targeted increased participation by homeowners with low rates of broad-based success.

Needed: A Holistic Retrofit Program Environment

Developing a viable retrofit program requires more than the cobbling together of multiple approaches. As Fuller (2010) notes, significant resources and creativity need to go into promoting home energy improvements to increase participation rates. Most existing programs provide an assembly of program components but offer no centralized environment that can

guide homeowners and make it easy for all professional sectors of program membership to "buy in" and take part. Based on feedback gained from various studies, Earth Advantage Institute began developing a list of infrastructural requirements for a holistic program framework that could motivate and facilitate program participation.

These requirements include:

- **Education of agents of transformation** who are well positioned in a community to spread the word about the program and its benefits by word of mouth and repeat contact.
- **A natural market mechanism** that can serve to motivate all segments of the targeted population, whether from an energy efficiency perspective, a financial perspective, or even a status-related or competitive perspective. The value proposition of such a mechanism must be clear enough that both homeowners, energy contractors and all related service sectors (real estate, appraisal, lending) can see significant opportunity with even minimal effort. Most important, such a mechanism will serve to keep the program going after public funding has been used up.
- **The ability to seamlessly centralize or channel all information** so that all components are aggregated, visible and easily monitored.
- **Training of qualified energy contractors** to work within the new framework, providing them with a fast ramp-up period to proficiency and business opportunity.

The energy performance score: A market mechanism and metric for an energy efficiency "Ecosystem"

In a 2008 survey of homeowners in Oregon by Earth Advantage Institute, respondents were asked what would motivate them to pay for energy upgrades. The overwhelming majority asked for an energy efficiency indicator demonstrating 1) how their home ranked 2) what they could do 3) what impact it would have and 4) how their homes compared to some average. The organization determined that one of the best ways to achieve this objective was through energy performance labeling.

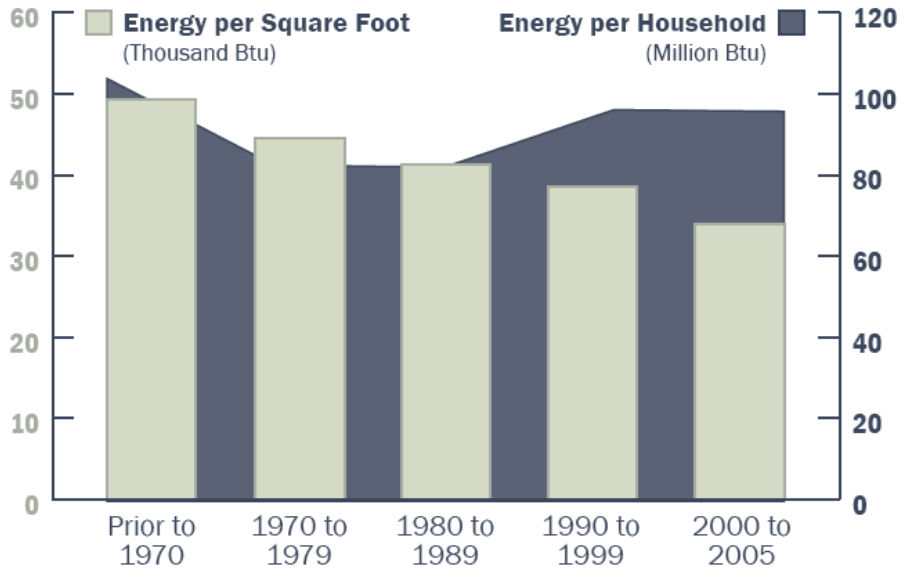
THE IMPORTANCE OF THE LABELING METRIC

However, not all energy labels are effective. The metric used is very important. Any new label and methodology must measure meaningful energy units that are understood in the marketplace. Some suggestions for rating homes in the United States include energy use per square foot per year or a relative index score from 0 to 100. Both of these fall short when compared to energy use per year.

Energy use per year, when measured systematically, is easier to decipher than other units and applies equally to all homes in all climates. Energy use per square foot per year is often proposed as a metric for residential efficiency, but this can mask the actual effects of house size. Figure 1 shows the how the trend toward greater efficiency per square foot in the U.S. has not led to lower energy use per household.

Utilizing total energy use as a metric allows home owners to quickly understand that 4-bedroom homes will have higher energy use per year than 1-bedroom homes, just as they understand a large SUV will have a lower miles-per-gallon (MPG) rating than a compact car. Energy efficiency-minded shoppers will look for the home with the lowest estimated energy use per year that also meets their needs. The label will also provide them with a target energy use against which they can track their actual use. This could be especially engaging for homeowners if the house were equipped with an electronic display or "dashboard" that monitored energy use in real time, helping people to understand their energy behavior.

Energy labeling alone doesn't tell us all we need to know. Carbon emission labeling is also of great significance. The im-



(PECI 2010)

Figure 1. Energy per Square Foot versus Energy per Household.

portance of knowing the carbon emissions produced by a home will only grow over time, and any proposed labeling system must include a carbon metric. Miles-per-gallon (MPG) stickers are a good example of an integrated energy and carbon standard. They have been in circulation for over thirty years as a respected fuel performance indicator, and as of 2012 new automobile sales stickers in the United States will feature carbon emission indicators as well as a miles-per-gallon score (www.fueleconomy.gov).

EPS HISTORY AND CHARACTERISTICS

The EPS methodology was validated during a 2008 pilot program conducted on 300 existing homes by Earth Advantage Institute, with the support of Energy Trust of Oregon. This comprehensive initiative and the August 2009 final report (Earth Advantage Institute & Conservation Services Group 2009) attracted national attention, including inquiries from the Clinton Climate Initiative, U.S. Department of Energy, New York State Energy Research and Development Authority, and the World Business Council for Sustainable Development. EAI's report detailed the best protocol, audit procedures, software modeling tools, price points, and consumer messaging for wide scale deployment of the EPS performance metric. The report also outlined the training curriculum developed by EAI that is needed for the trade contractor network, agencies, cities, and state energy offices.

An Energy Performance Score looks at a number of different criteria that are then fed into a software program for modeling. The procedure, conducted by trained professionals, includes collecting utility bill information, measuring and sketching the home, recording window type and shading, insulation values, exterior and interior lighting fixtures, appliances, inspecting ducts and performing a blower door test. These data and other measurements are entered into a database to generate a model that determines score.

EPS has incorporated several important characteristics for successfully applying an MPG-style metric to scoring homes, including:

- Easily understood by the general public.
- Meaningful in different contexts to stakeholders in various sectors.
- Applicable to new and existing homes so that comparisons can be made between homes.
- Useful for indicating progress toward individual and community energy goals.
- Helpful to homeowners as a baseline against which to evaluate impact of retrofits.
- Consistent over time.
- Affordable for the homeowner.

EPS Components

The EPS has three components: the audit, the Score Card or label, and the recommendation report to guide improvements in a cost-effective manner. The Score Card also reflects a potential "after upgrades" score and other energy goals that the homeowner may aspire to. EPS information technology is able to customize the goal benchmarks on the Score Card to guide the type of upgrades most appropriate for the homes in a particular region. Homeowners can compare their own EPS scores to those of other homes, take measures to improve the scores, and use the improved performance as a valuable selling point when selling the home. Retrofit contractors can demonstrate the effectiveness of upgrades they install through this third-party EPS rating. The EPS can also be used to qualify homeowners for applicable incentives and financing advantages.

Calculating carbon emissions is an integral part of the EPS and completes the picture of energy use in the home by indicating the impact on greenhouse gas emissions of different fuels. The carbon score balances the fuel efficiency bias that results from only using an energy score. In this way the carbon score helps the EPS to be a more fuel-neutral approach. Homeowners in certain communities may be very interested in knowing the carbon emissions associated with home energy use.

The EPS approach ensures that messaging resonates with these target audiences to highlight the carbon issues. On a broader level, the EPS infrastructure offers tracking of carbon emissions that is increasingly central to emerging energy policy at the local, state, and national levels. By reporting a carbon score along with an energy score, the EPS creates a metric that ties home energy use to governmental, community, and individual carbon emission goals.

EPS Chronology

2008: Pilot program of 300 homes in Portland and Bend, Oregon, measures accuracy of software against other platforms. EPS proven to be most accurate. Homeowners appreciate the understandable metric.

2009: Launch of voluntary EPS program for new homes in Energy Trust of Oregon territory.

2009: Both Oregon and Washington State legislatures create task forces to explore mandatory ratings at time of listing.

2009: Earth Advantage awarded contract to train auditors on EPS, educate real estate professionals and appraisers, and provide web information portal for homeowners as part of 5,000-home Seattle retrofit pilot.

2010: Earth Advantage Institute awarded Bellingham contract for training of auditors on EPS platform as part of 1,200 home retrofit pilot.

2010: Earth Advantage continues to meet with and inform U.S. Department of Energy on EPS results as DOE seeks to develop its own voluntary rating system.

2010: DOE announces its own standard, the Home Energy Score, which offers a simple 1-10 relative score based on comparisons with other similar homes in the same area.

2010: DOE provides funding to Lawrence Livermore National Laboratories and Earth Advantage Institute to compare EPS scores obtained during work in Seattle with Home Energy Scores on the same homes.

Table 1. EPS program elements.

SEATTLE EPS PROGRAM ELEMENTS	BELLINGHAM EPS PROGRAM ELEMENTS
Auditor Training	Auditor Training
Realtor/Appraiser Education	
Centralized Information System (Web Portal)	Centralized Information System (Advocate Team)

2010: DOE funds a four-state project that will roll out the EPS in locales in Massachusetts, Virginia, Alabama and in additional cities in Washington State.

The EPS Program Infrastructure: Scalable, Modular

There is no single barrier that limits the widespread adoption of residential energy efficiency retrofits. The focus group and survey results of an EPS energy-labeling pilot conducted by EAI in Oregon (Energy Trust of Oregon, 2008) identified the homeowner's needs as:

1. Information on how the home performed.
2. Information on how the home could be improved to achieve higher levels of energy efficiency.
3. Energy upgrade recommendations that the homeowner can follow.
4. Access to affordable finance to enable the retrofits to occur.
5. Access to a skilled and trusted workforce.

The Oregon project also identified three factors that must be present for a homeowner to move forward with a retrofit decision: simplicity, trust, and accountability. This translates into the need for a streamlined one-stop shop approach that engages the homeowner in the process, reinforces trust in the contractor conducting the retrofit process, and satisfies the homeowner that a rigorous measurement and verification process is in place to ensure that actual gains in efficiency align with expectations. Consumers also need assistance with access to available finance options, tax credits, rebates, and other incentives that may be applicable in their locale.The EPS program infrastructure is comprised of three modules, which can be deployed together for maximum effect, or individually. The modules are 1) auditor training 2) realtor/appraiser education, and 3) a centralized information system for the consumer that simplifies the audit and energy upgrade process. As a program, these modules serve to engage partners and stakeholders to develop one clear outcome: sustained consumer demand for energy efficiency in the residential retrofit market. The EPS model demonstrates how the current US national retrofit market penetration can be improved for dwellings in a particular region. The model also crafts a compelling value proposition that appeals to the consumer. The approach engages the consumer in the retrofit process in ways that have not been done before, resulting in lower operating costs; increased comfort, health, and safety; enhanced property values, lower greenhouse gas (GHG) emissions, and the potential to stimulate employment and the local economy.

Seattle Program Structure

The City of Seattle recognized the need for greater energy efficiency in the residential buildings of Seattle. It decided to support a new single-family residential energy audit pilot program funded by the local utilities (Puget Sound Energy and Seattle City Light).

In 2009 Earth Advantage Institute submitted a proposal for improving the retrofit rates for a pilot program targeting 5,000 single-family homes. The proposal took into account the requirements that would help generate an effective, integrated program that could drive homeowners across both political and economic spectrums towards energy upgrades.

It was planned that the project would develop a standardized Energy Performance Score (EPS) audit protocol that evaluates single-family home energy performance and identifies cost-effective efficiency improvements. The plan called for the EPS tool to be used by the audit pilot program and for it to become a regional standard for residential energy evaluation.

PROPOSAL ELEMENTS

The proposed strategy to evaluate the energy performance and associated carbon emissions of single-family dwellings was designed to deliver clear and measureable outcomes:

- An EPS tool calibrated for use in the Seattle climate region that issues home scores and recommendation reports for retrofit upgrades.
- Training offerings designed for the auditor, contractor, program administrators, utility, and real estate and appraisal professionals.
- An online EPS rating database with an associated Web Interface Portal (WIP) that connects the homeowner with the contracting pool and finance mechanisms available to consumers.
- Eventual linkage to Seattle's Multiple Listing Service (MLS) to inform home buyers and real estate agents of the EPS scores of homes on the market.
- A fully integrated customer experience via the web information portal to enhance market adoption of home energy efficiency.
- The results from home energy audits being offered by the City of Seattle on a subsidized basis for 5,000 dwellings.
- An audit protocol and a quality assurance program to ensure the integrity of audit and retrofit data.
- Regular progress reports detailing the status of audits, upgrades, budget, and timeline.

The proposal recommended a program centered around the EPS, a metric, tool and system that could be well understood by the larger community. An Energy Performance Score could provide an additional perspective on a home purchase, and offer guidance for buyers in the same way that publicly available tax and school district information also helps buyers to make informed home purchase decision. Additionally, an energy score could motivate homeowners to retrofit: through 1) a graphical and ratings-based understanding of where their home ranked in energy efficiency 2) relative indicators of their home's actual and potential score, and 3) indicators of how they compared to other homes in Seattle including their neighbors. The Score Card would also permit the homeowners to see the potential increase in resale value, the improved comfort potential, and the potential long-term reduction in energy expenditures.

The key to greater participation by households was the web information portal (WIP), which aggregates all the disparate components of a retrofit program in one place – a web page – creating a digestible format for the homeowner that makes it easy to take action.

EPS Auditor Training

The EPS workforce training offered to auditors is not intended to replace existing training, but rather to build on it in a complementary fashion. The EPS Auditor training requires Building Performance Institute (BPI) Building Analyst (or equivalent) certification as a prerequisite. The training reviews building science basics, trains auditors on the data collection needed, the use of the online EPS tool, and the best practices for making recommendations. In addition to traditional, cost-effective home upgrades, the EPS Scorecard includes optional deep energy retrofit improvements presented as an educational experience for homeowners and auditors alike. This part of the tool provides added value by exposing homeowners to energy upgrade ideas that may be foreign to them, and allowing auditors to become accustomed to analyzing a house to reach much higher levels of performance.

The overall aim was both technical assistance as well as education to help auditors understand the business opportunities behind the energy labeling system, so that they would want to promote the EPS themselves and ultimately make it a self-sustaining program. By learning to use wireless, web-based data entry as well as automatic generation and posting of photo-filled reports to a website, auditors would be able to process audits more quickly, impress customers with promptness and report quality, and move rapidly on to the next audit.

Realtor/Appraiser Education

Increasing knowledge among real estate professionals and appraisers is critical to gaining wide acceptance of the real value of energy efficient homes and to the acceptance of any energy efficiency program. Real estate professionals are in a strong position to educate consumers about the value of energy audits and making energy efficiency upgrades. Additionally, appraiser education on valuation techniques for energy efficiency upgrades would allow the financing mechanisms for retrofits to operate successfully in the marketplace.

- **Real estate professionals.** This proposed education draws on EAI's two-day Sustainability Training for Accredited Real Estate Professionals (S.T.A.R.) program, which is presented both in classroom format and online. S.T.A.R. educates real estate professionals about the features and benefits of new and existing green homes, the advantages of energy efficiency and the EPS, and how to explain EPS features to their clients. Real estate agents will also serve as an engagement channel to reach potential homeowners interested in auditing and upgrading their homes.
- **Appraisers.** EAI utilizes a subcontractor educator to deliver its Residential Green Appraiser Series that is designed to develop residential appraisers' knowledge of EPS and high performance buildings; provide the most recent cost and value data available; and enable participants to complete an informed appraisal of a green home. The two-day course includes informational lectures, home site visits, and a hands-on opportunity to assess the value of a high-EPS home.

EPS Information Technology Infrastructure – Rating Database, Administration, MLS, Web Interface Portal (WIP)

Integration of the EPS software tool into any existing auditing protocol is relatively straightforward. EAI works closely with the auditor and contractor pool to deliver an EPS rating for each of the homes targeted in this project. The tool only requires 23 specific data inputs to calculate total home energy usage, which contributes to the affordability of an EPS rating. These inputs are gathered during a typical auditing procedure or can be easily added afterward. To confirm compliance with established EPS software protocols, for the duration of the project period, EAI oversees quality control inspections (10 % of all audits) on the data collection, record maintenance, and software data entry required for use of the EPS software tool.

Streamlining the process by aggregating home retrofits achieves economies of scale and seamlessly connects stakeholders with contractors, utilities, lenders, and others essential to the retrofit process. This is achieved by offering homeowners access to an Internet web portal. The Web Interface Portal (WIP) developed by Earth Advantage Institute offers the appropriate tool to the homeowner. This portal provides a simple way to engage in the retrofit process by connecting homeowners with qualified contractors following an EPS rating.

The WIP allows contractors to view submitted EPS ratings and recommended upgrades, and to provide (upon homeowner opt-in) an online estimate for the jobs. The consumer can view contractor estimates, as well as rankings and testimonials posted by other consumers, reinforcing the trust factor for the homeowner. Through the WIP, the consumer can also access financing, rebates, and incentives, schedule a contractor to conduct the work, and schedule a post-upgrade EPS audit for a new score. The consumer benefits from the WIP experience as it assembles all the stakeholders and associated services in one manageable area.

The online EPS database stores all home EPS ratings and provides the link to the local Multiple Listing Service database. It offers wireless access so that audit staff can upload the results of an EPS audit from the field and generate an EPS Score Card and Recommendation upgrade report immediately through an easy-to-use template. The database developed by Earth Advan-

tage Institute is accessed via the Seattle Energy Office Web site, which offers appropriate user log-on access, security, reporting, and scalability. The reporting function includes information on measures installed, average retrofit job, number of estimates provided per EPS audit, average savings in energy and carbon, and quality assurance feedback.

In the Seattle program, homeowners find out about residential retrofitting through the Seattle City Light website, where they click through to WIP site to sign up for an audit. The City of Seattle currently subsidizes the cost of an EPS audit, reducing the cost from more than 289 Euros to 69 Euros.

Following the audit and the auditor's analysis, homeowners review the home's EPS and the accompanying Energy Analysis Report online at the same site. They are notified via email when the documents have been posted by the auditor and are ready for review.

The City's financing choice created a delay in upgrade work. While the original proposal by Earth Advantage Institute called for the integration of competitive financing bids into the web portal, the suddenly availability of additional stimulus money after the program commenced prompted the City of Seattle to eliminate this feature. Instead, the City opted to create its own exclusive financing program, CommunityPowerWorks, administered by city officials, managed by private contractors, and using loan funds from a regional nonprofit bank. According to conversations between City officials and Earth Advantage Institute staff, Seattle seeks to emulate the success of the previously mentioned Clean Energy Works on-bill program located in Portland, Oregon. The CommunityPowerWorks plan is to offer on-bill financing at two levels, a subsidized package for homeowners that meet low-income criteria, and a separate "standard" rate for other homeowners.

Bellingham Program Structure

In the case of Bellingham, Washington, the city had already designed a residential retrofit program proposal for which it had received federal funding.

The structure relied on a human interface model for guiding homeowners seamlessly through audits, contractor selection, and financing options. At the same time they had heard about the Energy Performance Score and wanted to integrate it as a key element of their program. Earth Advantage proposed a standard implementation of the three-part EPS (audit, scorecard and recommendation report) coupled with auditor training on the EPS tool. Education of the related professional sectors as market transformation agents was not included as part of the current phase.

Under the program procedures, the Opportunity Council (the administrative entity) conducted outreach efforts through its Community Energy Challenge website. Homeowners fill in an online application to what the site calls a "one-stop energy shop" and set up an appointment for a subsidized audit of 146 Euros, 71 of which can be credited towards energy upgrades when the work is undertaken. The full cost of the audit to the City is 430 Euros per home.

After the audit, the designated "Home Energy Advisor" produces a full-color home energy report documenting existing conditions and provides the homeowner with an EPS scorecard. The report offers customized "Energy Action Plan" detailing quick fix, low-cost and long-term recommendations. Homeowners are directed to a loan description site explaining discounted loan fees and special interest rates for a local bank affiliated with the Challenge. Homeowners may also review an explanation of cash incentives ranging from 374 to 1,123 Euros, with additional incentives available for new high-efficiency hot water heaters and gas furnaces. The website weaves in messaging about how the retrofit program creates jobs for local professionals through ARRA money.

Results

SEATTLE

No conversion data is available from Seattle yet, as the City has not established a formal tracking mechanism to monitor upgrades. It has been focusing its efforts on establishing the City-administrated CommunityPowerWorks on-bill financing program that will provide homeowner loan financing options electronically to the web information portal. However, 940 audits have been conducted as of March 4, 2011 (prior to the launch of the CommunityPowerWorks program) and the rate is steady at about 150 audits per month.

Some of these homeowners have undertaken energy upgrades on their own using savings or standard financing, although the exact number is not known. The CommunityPowerWorks program is due to commence shortly. Earth Advantage Institute is seeking permission from the city to interview these self-financed homeowners to find out what energy upgrades they undertook and why. These data may provide more clues as to what motivates homeowners to undertake upgrades in a "conventional" market situation.

BELLINGHAM

According to March 3, 2011 conversations with the Opportunity Council, of 330 assessments carried out so far, 150 have completed or commenced energy upgrades, a 45 % uptake rate. Based on the average Washington State single-family home estimate of 25,100 kWh in energy consumption, these homes are saving 7,281 kWh or 29 %. Homeowners are asked to bring in their bills as history for more accurate verification.

Homeowners particularly like the fact that they are using auditors and contractors from a pre-selected group of trusted, trained contractors that have been vetted by the local Opportunity Council running the program, and that it includes a quality assurance inspection provided by the Building Performance Center, a BPI proxy group.

Incentives and lower costs also play a role in the program's success. The average upgrade job cost is 4,492 Euros and this amount is typically offset by 30 % in incentives to make cost per home an average of 2,994 Euros. High initial demand slowed the program and there was an initial six to eight week lag time. There were three energy advisors, each of whom manages 20 to 25 projects, including post-audit walk-throughs and all stages of paperwork. The bottleneck has since been resolved as advisors become familiar with the process and challenges. However, advisors typically don't engage with homeowners until two weeks after the building analyst/auditor has completed the assessment.

Conclusion

Two large-scale residential retrofitting programs are in progress in Washington State. These programs are yielding initial insights into how the country can better target broad homeowner populations using modular and scalable programs built on the principles of seamless, one-stop information; innovative and sustainable market mechanisms; professional and community "champions;" and consumer engagement offered by web-based streamlining.

The Bellingham results seem very promising, based on a centralized information system that uses a team of energy advocates and one-to-one contact in facilitating the process for homeowners. The availability of additional stimulus money caused delays in the Seattle program as the City opted to pursue a different energy upgrade financing option than what was originally planned. It is not yet known whether the high level of interest in audits will convert to a critical mass of energy upgrades. However, the availability of on-bill financing in two tiers, where no up-front payments are required, may assist in persuading homeowners that energy upgrades offer a cost-effective solution for comfort and increased home value. Further results will be analyzed and published as the program continues. It will be interesting to compare the results from the two cities' slightly different approaches to retrofitting.

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