

Scaling Up Energy Ratings, Labels, and Scores: Latest Trends to Promote Widespread Adoption

Joan Glickman, U.S. Department of Energy

Gannate Khowailed, CSRA

Emily Levin, Vermont Energy Investment Corp

Richard Faesy, Energy Futures Group

David Heslam, Earth Advantage

Billi Romain, City of Berkeley

ABSTRACT

For decades, many have argued that efficiency ratings for new homes are critical to improving the efficiency of our nation's housing stock. But, for a variety of reasons, ratings have not become a mainstay of the existing homes market. Fortunately, a number of states, cities, utilities, and even real estate stakeholders are pioneering scale-up plans for energy scores and labels adoption as a mean of ranking the energy performance of existing homes and motivating investment in energy efficiency. These pioneers will have first market entry advantage in their territory and will reap the benefit of this market transformation activity. However, spurring consumer demand for this information is still a challenge. And, until labels are available for a significant portion of homes, their potential impact is still limited.

This paper examines the current state of home energy labeling in the U.S. after first addressing some of the most common barriers and challenges to labeling uptake. Subsequent sections of this paper provide examples of how pioneering states, cities, and utilities are working to overcome these obstacles as well as alternative approaches to promote scale-up in years to come.

Introduction

Home energy labels are not a new concept. A number of recognized systems – such as Home Energy Rating System (HERS) and ENERGY STAR – have been in place for more than a decade. And, newer options like the Home Energy Score (aka “Score”) are now available as an attractive alternative for existing homes. The Score was created by the U.S. Department of Energy (DOE) in 2010 to serve as a miles-per-gallon type rating for existing homes. It helps homeowners and buyers understand how much energy a home is expected to use and provides energy efficiency recommendations. Recently labels are gaining more traction with thousands generated monthly. However, some challenges persist, highlighting the need for additional solutions to drive the market to the scale required for ratings to realize their full potential.

Barriers

Home energy labels have been used in certain niche markets for decades, but, even with viable products in the market, advocates of energy labels continue to face obstacles to widespread use of these tools. While collaborative efforts among public and private stakeholders have led to

significant improvements – such as lower-cost ratings and greater interest among real estate organizations – the following impediments, among others, continue to hinder scale-up.

Market Confusion. Most buyers searching for information about a home’s energy efficiency features, let alone its overall performance, are likely to come up short. If they are lucky enough to find ratings on homes of interest, they will likely see a range of scores generated by different tools and using different scales to communicate efficiency. Consumers and real estate agents frequently don’t know what these ratings mean. The market needs a “translator” that can help stakeholders involved in the real estate process interpret the various pieces of information.

Multiple Use Cases. One of the challenges of designing and implementing a labeling initiative is the multiple stakeholders and various potential uses of a label. Program design and planning should consider stakeholder interests and how the labels are intended to be used. Common energy labeling “use cases” and stakeholders are listed in Table 1. Based on the multitude of use cases, it is clear that a label and the tool that generates it need to be adaptable. For instance, if a program is going to leave behind a label after upgrade work is complete; it makes no sense to generate energy improvement recommendations at that time. However, if a homeowner is interested in assessing upgrade options, the tool needs the ability to provide a label that presents scores for different packages of improvements. Different use cases will dictate different needs, and the scoring tool and label should correspond with those needs.

Table 1. Energy Label Use Cases

Use Case	Stakeholder												
	Seller	Buyer	Home Owner	Renter / Tenant	Landlord	Realtor	Lender	Appraiser	Home Inspector	MLS	Municipality	Utility / Eff. Program	Contractor / Builder
Time of Listing	X	X				X			X	X	X	X	
Time of Sale	X	X				X	X	X	X	X	X	X	
Time of Purchase-Information		X				X	X		X			X	X
Time of Purchase - Upgrade		X					X	X	X		X	X	X
Existing Home - Pre-Upgrade			X				X				X	X	X
Existing Home - Post-Upgrade			X								X	X	X
Weatherization Assistance Program			X	X	X							X	X
Rental Property Disclosure				X	X						X	X	
Rental Promotion of Efficient Property					X							X	
Foreclosure-Information	X	X					X		X				
Foreclosure - Upgrade		X					X	X	X				X
Energy Code Compliance		X				X	X	X		X	X	X	X
Energy Efficiency Program Compliance			X		X						X	X	X

Quality Assurance. The principal rating systems used in the U.S. require some type of quality assurance, ranging from desk audits to mentoring or repeat home walk-throughs that compare scores generated by different assessors. The appropriate level of review needed to assure quality and confidence in ratings systems is not clear and some methods may be cost-prohibitive. Repeat visits are particularly challenging in existing homes since it requires the consent of the homeowner or real estate agent, not simply the builder who requests ratings for new homes.

Information vs. Immediate Energy Savings. Ratings provide valuable information that is intended to influence purchase decisions and motivate investment in efficiency improvements, transforming the market over time. But it is difficult to directly attribute energy savings to efficiency ratings. Therefore, utilities are sometime hesitant to invest in labeling program.

Fortunately, as evidenced in some of the case studies below, some utilities recognize that integrating ratings into their offerings is a low-cost approach to market transformation.

Insufficient Integration in Real Estate Transactions. Point of sale transactions are perhaps the most likely “use case” for ratings. Lenders have products that link efficiency ratings and scores to mortgage incentives. Appraisers have the ability to adjust valuation based on ratings and energy estimates. Sellers who have made improvements are interested in using ratings to make their investments visible to prospective buyers. Finally, studies suggest that buyers prefer efficient homes and value energy use information. And even if that means that their prospective new home uses more energy than average, they would still rather know that (Elevate Energy, 2014). Yet, ratings and scores are still not readily found in the 700 + U.S. multiple listing services (MLS). Mortgage brokers don’t market their efficiency products; appraisers prefer simpler valuation methods. So, both data flow and process barriers still impede the potential impact of ratings in these transactions.

Application Programming Interface (API) Integration. The majority of residential labeling programs to date have been an add-on to an existing utility program or a market based inspection service. In such delivery models existing data collection or energy modeling software is already in place. API allows the Scoring tool to connect to existing softwares for seamless data transfer and avoiding the need for double data entry. First cost for API is a barrier but once it’s completed all users can integrate the Score into their offerings. Currently CakeSystems, Energy Savvy, Home Inspector Pro, Optimizer, PSD Consulting, Snugg Pro, Spirit Foundation, and the United Illuminating Company/ EverSource Home Energy Solution software are all connected to the Home Energy Scoring Tool. The Snugg Pro team is working on finalizing the API Integration in the near future.

Exemplary Models

Fortunately, states, utilities, and cities are making progress at overcoming barriers to scale. This section will highlight transformational efforts by the states of Colorado, Vermont, and Oregon, City of Berkeley, and utilities across the country in scaling residential labels.

Colorado: A Statewide Initiative to Make Energy Information Available at Point of Sale

Background. The Colorado Energy Office (CEO) is leading efforts to integrate the Score into a variety of programs across the state, with an end goal of including it on the state’s multiple listing services (MLSs). This will allow buyers and others to make energy-informed decisions at point of sale. The state has tied the Score to its Energy Saving Mortgage Incentive, which provides homeowners up to \$3,000 if they improve their score by making energy efficiency improvements (\$750 for every point increase on the Score scale, up to a maximum of four points). The up to \$3,000 will be credited towards the homeowner’s principal mortgage amount.

Funding. The state effort is mainly funded by the state’s energy office annual budget. The state also used some seed funding from its State Energy Program (SEP) grant awarded by DOE.

Real Estate Integration. The state of Colorado has been a leader in its engagement with the real estate community, coordinating closely with MLSs to enable sharing of energy information, integrating green fields that list Scores and other recognized ratings in MLSs, sponsoring appraisal valuation studies, and educating real estate agents on the value of energy efficiency, including a new course specifically on the Score. The new free course qualifies real estate agents for continuing education credits. CEO provides real estate agents with free Score assessments to offer their clients as a way for real estate agents to familiarize themselves with the Score.

IT Infrastructure. The state invested in its IT infrastructure and is capitalizing on Optimizer and Cake Systems Application Programming Interface (API) connection to the Score, hence eliminating the need for double date entry. Snugg Pro will also be used once it's API compliant.

Delivery Models and Status. Due to the API integration, the Score can be offered with all utility sponsored energy efficiency audits throughout the state. The state also coordinates with home inspectors to offer the Score at point of sale. The state is covering the cost of the first 20 scores completed by every home inspector to increase their familiarity with the Score. Inspectors connect homebuyers with an energy advisor after they receive their score. The energy advisors are trained on explaining the Score and follow up with leads generated at point of sale. Finally, the state contracted with the Building Performance Institute (BPI) to perform quality assurance (QA) for the statewide program. As of April of 2016, the state has more than 30 Score Assessors who have scored more than 200 homes, with a target of 2,000 Scores by June 2016.

Remaining Challenges. The Colorado Energy Office does not have authority to publish individual Scores without written authorization from homeowners. It will coordinate with the Colorado Department of Regulatory Affairs and Real Estate Commission on potential solutions.

Vermont: A Statewide Approach to Home Energy Labeling

Background. Vermont Energy Investment Corporation (VEIC), in collaboration with Efficiency Vermont, the state's energy efficiency utility, is leading Vermont's home energy labeling initiative. Vermont has developed a statewide home energy label, known as the Vermont Home Energy Profile, which includes three key metrics: annual energy usage in MMBtus, Home Energy Score, and annual energy costs. The Profile also summarizes the features that contribute to the home's energy performance, such as insulation levels and heating system efficiency. In 2016, Efficiency Vermont is training building performance contractors, weatherization auditors, and home inspectors in the use of the DOE Home Energy Scoring Tool (Scoring Tool) and will implement a pilot to test the Profile in Vermont. The pilot will assess the conditions under which homeowners, home buyers, and home sellers are willing to pay for the Profile, how much they are willing to pay, and how contractors and home inspectors are able to incorporate Profile delivery into their business model. The pilot will be market-based with no incentives.

Funding. Start-up costs for the energy labeling initiative are being funded primarily by a DOE SEP grant, coupled with matching funds from Efficiency Vermont. Efficiency Vermont is funded

primarily by an energy efficiency charge paid by electric ratepayers, with supplemental funding from the Regional Greenhouse Gas Initiative and New England Forward Capacity Market.

Real Estate Integration. Through the Vermont Green Homes Alliance, Vermont has long engaged with the real estate and lending communities to increase knowledge of energy efficiency and high performance homes. In 2015, the Vermont Green Homes Alliance worked closely with real estate agents and trade group, to hold a Green Real Estate Symposium offering continuing education credits to real estate agents and appraisers that attracted more than 200 participants. Vermont and New Hampshire are also engaging with the regional MLS, the New England Real Estate Network, to update and add green fields. Vermont is currently working with real estate agents and home inspectors to promote the Profile to home buyers and sellers at time of sale.

IT Infrastructure. Vermont is in the early stages of developing its IT infrastructure and will use the 2016 pilot to scope long-term needs. During the pilot phase, contractors and home inspectors will enter data directly into the DOE Scoring Tool. They will then log into Efficiency Vermont's Home Energy Reporting Online (HERO) tool to import data from the Scoring Tool and generate the custom Vermont label. The Weatherization Assistance Program (WAP) intends to link its Hancock software to the Scoring Tool via the API.

Delivery Models and Status. The Profile will be delivered via multiple channels with the goal of making it widely available. Contractors participating in the Efficiency Vermont Home Performance with ENERGY STAR (HPwES) program will be able to offer the Profile at time of energy audit and in conjunction with retrofit projects. WAP auditors will deliver the Profile on completion of a weatherization project. Vermont is also working with real estate agents and home inspectors to offer the Profile at time of sale, as an optional "energy inspection" add-on to a home inspection. Efficiency Vermont will serve as the statewide Home Energy Score partner and will coordinate training, mentoring, and QA. Efficiency Vermont has trained around 20 contractors, home inspectors, and WAP auditors as Assessors and aims to deliver at least one hundred Profiles through its pilot in 2016. Pending pilot results, Vermont will determine next steps and funding options for the state's home energy labeling initiative.

Remaining Challenges. Score training is fairly time-consuming and Efficiency Vermont provided extra support to help contractors and inspectors. Of the approximately 35 potential assessors who initially expressed interest, 20 successfully completed the training process to become Assessors. Some chose not to participate after learning about the time required for training, while others struggled to navigate the simulation tool and associated software requirements, even with significant hands-on support from Efficiency Vermont. IT integration also requires significant up-front investment. It has proven challenging to identify funding to pay for both start-up and ongoing costs of the state's labeling initiative. While Efficiency Vermont has contributed funding, it can be difficult for a utility – even energy efficiency utility – to justify investment in market transformation activities that do not generate immediate energy savings.

Oregon: Creating a Level Playing Field for Labeling Systems

Background. Oregon law has provided guidance for home energy ratings since 1977, but it was only with the implementation of the Energy Performance Score (EPS) by the Energy Trust of Oregon (ETO) in 2009 that a labeling concept found a strong niche in the market. ETO began providing EPS labels for new homes in 2009 and later expanded to offer labels to homes that participated in the HPwES program when requested by a homeowner. HPwES is now largely delivered by Enhabit, which has standardized the delivery of EPS labels.

With the passage of House Bill 2801, the state took on a more active role per requirements to establish professional standards for a new class of individuals (Home Energy Assessors) who can officially issue labels, and to create standards for the information to be included on a label. The need for this legislation arose because multiple labeling systems were operating without coordination or consistency. Three labeling systems have been conditionally approved for use in Oregon after making modifications to their label formats. These include: HERS from RESNET, Home Energy Score from DOE, and EPS from ETO.

In providing conditional approval to the three systems, Oregon Department of Energy (ODOE) voiced concern about consistency of information between the three systems. The stakeholder advisory committee has committed to analyze methods in 2016 to provide consistent home energy performance information between the three systems that may include the common usage of the Home Energy Score calculation engine to compute annual energy use estimates.

Real Estate Integration. The Regional Multiple Listing Service (RMLS), which covers most of Oregon, was the first MLS in the nation to add green fields in 2007. Recently, RMLS has added fields for HERS, Home Energy Score and EPS. In 2008 ETO and Earth Advantage, a non-profit promoting green building, began delivering green classes for real estate professionals. ETO continues to financially support education to the real estate community, both agents and appraisers, and Earth Advantage has collaborated with other providers to offer a comprehensive catalog of online and in person energy performance related courses that are approved for both Realtor and appraiser continuing education credit.

Although the RMLS database has fields for energy performance information, that alone doesn't guarantee the usage, or the proper usage, of those fields. Recent studies by appraisers have shown that most homes with an EPS are listed as such in RMLS and that there are many homes with other energy performance related fields which have been mis-entered. Automating the provision of energy performance information and continued education will both be key to fulfilling the promise of real estate integration.

Funding. EPS efforts have been funded by Energy Trust of Oregon, HERS efforts have been funded by RESNET and Score efforts have been funded by DOE and the Eugene Water and Electric Board. The involvement of ODOE staff has been funded from the ODOE budget and stakeholders have volunteered a large number of hours for the development of standards.

IT Infrastructure. In 2015 RMLS, Earth Advantage and ODOE teamed up to jointly lead a Home Energy Information Accelerator team with DOE. As a result of that effort a proposal has been made to develop a common registry of labeling information that could automatically populate data into RMLS and other real estate portals.

Delivery Models and Status. As mentioned above an EPS label is generated for new homes participating in the ETO new homes program and existing homes that are assessed by an Enhabit partner. The Score is currently offered through the existing homes auditing program at Eugene Water and Electric Board. There is a relatively small network of HERS raters in Oregon who primarily issue HERS ratings for new homes that need compliance documentation for federal tax credits.

Home inspectors can now be qualified to offer Score and EPS labels but there has been little interest given no marketing or incentives. As of January 2016, over 25 Home Energy Assessors and over 10,000 home energy labels have been issued. Annually, over 4,000 labels are generated in the state, split roughly between new and existing housing.

Remaining Challenges. Raising awareness of the energy information among buyers of existing homes is the biggest challenge. In 2016 the City of Portland is considering an ordinance that would require an energy label to be included with any home listing. Such a policy would greatly increase the visibility of home energy information within real estate transactions.

City of Berkeley: Requiring Energy Information at Point of Sale

Background. The City of Berkeley is leading efforts to provide home energy information at time of sale by requiring a home energy assessment using the Home Energy Score prior to sale through the Building Energy Saving Ordinance (BESO). This program replaces a previous requirement to verify 10 minimum prescriptive measures at time of sale. Moving from minimum prescriptive requirements to a customized performance assessment leverages utility incentives and energy use transparency to accelerate savings.

Real Estate Integration. In a community where 81% of voters supported the Berkeley Climate Action Plan, local real estate agents recognize that existing building energy efficiency is highly valued and have established a strategic partnership to educate buyers and sellers on the BESO requirements, as well as energy efficiency resources. Scores and reports are provided to potential buyers along with referrals to free technical assistance, incentives and financing. Scores are made publically available on the City website. Build It Green and the Center for Sustainable Energy are creating a green building registry in California, which will allow Scores to be automatically fed into MLS databases.

Funding. The Score assessments are paid for by owners and range from \$200 to \$400, with an average cost of \$220. StopWaste, supported by the Bay Area Regional Energy Network (BayREN), subsidizes the enrollment and mentoring of assessors and quality control. BayREN offers a free Home Upgrade Advisor service that proactively contacts homeowners with

properties that score 6 or below. To jump start the program, the City is offering 75 rebates for up to \$200 for early compliance (i.e. home not currently for sale) through a PG&E grant. As of February 2016, 50 rebates have been provided.

IT Infrastructure. The Home Energy Score – energy modeling, online database, and report generation – has been essential to creating a standard, free and accessible reporting system. As other efficiency software tools integrate the Score into their systems, there are opportunities to connect to ratepayer funded improvement incentives. The energy efficiency modeling softwares approved for use by the Energy Upgrade California (EUC) statewide incentive program, providing up to \$6,500 in improvement rebates, have just started to offer the Score. This will allow BPI contractors to provide both the Score and a scope of work that qualifies for financing and incentive programs.

Delivery Models and Status. Scores are provided by BPI contractors who have access to the EUC incentive funding and by home inspectors, who have long-term relationships with real estate agents. Often sellers will hire home inspectors based on the recommendation of real estate agents, whereas buyers are encouraged to hire BPI contractors. As of February 2016, 93 homes were scored with an average score of 5. The City anticipates issuing another 600 scores in 2016.

Remaining Challenges. The recommendations generated by the Home Energy Score do not align with the EUC program, so assessors currently have to run the score without recommendations and use a supplemental recommendation form. Re-running the report with custom recommendations adds too much cost and time to the assessments. The report therefore does not provide the potential score with upgrade, which is important information for the homeowner. However, the DOE is considering ways to simplify the process of customizing the recommendations and showing the appropriate post score. DOE plans to offer improved options for customizing recommendations in the near future.

Utilities: Integrating Labeling into Other Services

Background. Utilities are uniquely positioned to take advantage of the Home Energy Score. A growing number appreciate the Score’s simplicity, its robust energy model, QA, the credibility associated with DOE, and its ability to convey hidden and complex energy information.

Real Estate Integration. Real estate integration is a peripheral effort for most of the utility programs. Due to the nature of their business, utilities keep a close eye on immediate energy savings and real estate integration doesn’t offer these savings. However, with the appropriate favorable market conditions, utilities can be an instrumental player in real estate integration. For example, Columbia Water & Light (CW&L) in Missouri offers a final Score to homeowners at the conclusion of their energy efficiency improvements. That final score can qualify the home for the state of Missouri’s silver or gold certificates, which can be used in the real estate transaction. CW&L staff also teaches a course on building science principles to local real estate agents and has applied to qualify the course for continuing education credits.

Funding. Utility programs usually fund their residential labeling efforts as part of their normal energy efficiency budgets provided for by ratepayer surcharges.

IT Infrastructure. To avoid double data entry, utilities have either relied directly on the Home Energy Scoring Tool or pursued API integration for their modeling tool. For some budget restricted utilities, the ability to use the Home Energy Scoring Tool as an alternative to licensing an energy modeling software has been a driver.

Delivery Models and Status. The Score has proven flexible in that it can be integrated into various implementation models. Below are a few examples and their progress as of May 2016:

- New Jersey Natural Gas has scored more than 13,000 homes since 2012, primarily through its appliance rebate program. The utility provides the Score after the homeowner replaces an appliance with the goal of encouraging participation in the HPwES program.
- Since 2012, CW&L has scored more than 6,000 homes as part of its HPwES program. The score is provided before and after energy efficiency improvements to help homeowners understand the impact of their investment.
- Focus on Energy in Wisconsin developed a Score pilot in 2014 and scored about 1,000 homes as part of its quick energy audit. It plans on integrating the Score into its HPwES program in 2016 and will score about 3,000 homes annually.
- The United Illuminating Company and Eversource in Connecticut launched a statewide Score program through their Home Energy Solutions program in 2015. They have completed almost 10,000 scores and plan to score 12-15,000 homes annually.
- LG&E and KU in Kentucky are integrating the score into their weatherization program and plan to launch in 2016. The program will score 3,000 homes annually.

Remaining Challenges. While the Home Energy Scoring Tool is free to use it's still not always easy to persuade utilities and public service commissions to add a service that does not demonstrate immediate savings. Especially since there are costs associated with the delivery and implementation of the Score. In a study with NJNG, the independent evaluation team concluded that homeowners who received a Score are 15% more likely to sign a release form that allows contractors to follow up on future energy improvements. Unfortunately the NJNG insulation contractors didn't capitalize on the additional leads generated and hence limited the impact of the Score on project completion. Many utilities still want to know how much the score motivates homeowners to invest in efficiency. To provide that answer, DOE is working with stakeholders to better assess the score's immediate and long-term impact on energy use. Further, as utilities prioritize positive engagement with customers, some are nervous about the risk of delivering a low score that could label a home as "bad." In such situations, customer education is key to focus on opportunities to improve the home's energy efficiency and its score.

Most Promising Approaches

A number of states, cities, and utilities are making strides in getting homes scored, but as this paper acknowledges, there are still challenges in getting to scale. Although there's no one magic

bullet, the following approaches are beginning to gain traction and worth considering as attractive alternatives or complements to current strategies.

Home Inspectors and Real Estate Agents

Three out of four homebuyers paid for inspections in 2014 – that’s approximately 4 million home inspections in one year alone (WIN Home Inspection.2015). Building a sustainable business model for home inspectors to include residential labels as an add-on service for these inspections is a potential game changer. In 2016, the International Association of Certified Home Inspectors and American Society of Home Inspectors – the nation’s two largest home inspector associations – joined the Home Energy Score program as national partners. With these organizations putting in place infrastructure to support inspectors in offering the Score, the number of homes scored could grow exponentially over the next five years. Colorado, Vermont, and the City of Berkeley are pioneering this approach, and other states including New Hampshire, Wisconsin, and New York are ramping up or seriously investigating the opportunity, with the goal of scaling the market for residential energy labels at time of sale.

Financing

The widening array of energy efficiency financing options holds great promise for complementary growth in ratings and scores. With FHA expected to issue guidance on PACE this year, many states hope to reproduce the success that California has had in developing its \$1 billion residential PACE market. While homeowners do not have to use labels to qualify for PACE financing, ratings can be a way to identify potential improvements and/or to document the investments. Other options explicitly call for ratings. In January 2016, FHA updated its borrower qualification guidance to allow a 2 percent higher income qualifying ratio for homes that scored 6 or higher on the Home Energy Score. Similarly in March of 2016, Fannie Mae launched a new HomeStyle Energy mortgage loan, which allows borrowers to finance up to 15% of the “as completed” home value for energy improvements. To encourage lender participation, Fannie Mae is offering a \$500 credit to lenders for each loan they close. Applicable at point of sale or refinancing, the HomeStyle Energy loan requires a Home Energy Score, HERS report, or comparable locally supported report that identifies cost effective recommendations. DOE is working with Fannie Mae on identifying opportunities to showcase the HomeStyle Energy loan.

State and Local Ordinances

Following the lead of Berkeley, CA, the Cities of Portland, OR, San Diego, CA, Fort Collins, CO, Piedmont, CA, and Ithaca, NY have all initiated efforts to develop local ordinances that will focus on and may require some type of energy assessment or labeling for homes. These local governments are working with other key stakeholders to put in place systems that not only provide useful information at time of sale, but are viable in terms of implementation.

Generating Labels Based on Public Record Data

Recently one phenomenon gained ground rapidly is the rise of automated efficiency models. At least a few start-ups (e.g., ClearlyEnergy, EnerScore, UtilityScore) have developed systems that pull building information from public record databases to estimate annual energy costs and in some cases a rating (e.g., A-F). Some are successfully marketing their products to major home buyer real estate portals (e.g., Realtor.com, Trulia.com, Zillow.com). One business model for these start-ups is to provide the information for free, then sell leads to contractors when buyers seek more information or want to upgrade.

As these systems develop, the challenge will be ensuring that they are as accurate as possible and don't discourage consumers from getting more credible ratings or thorough assessments of efficiency opportunities. High scores or ratings are particularly worrisome because people have a tendency to adhere to the adage, "ignorance is bliss". If a home gets an "A" or low energy estimate through an automated model, buyers will be less likely to delve deeper and may overlook deficiencies that would be uncovered through a hands-on assessment. That's why DOE is collaborating with Elevate Energy and the National Renewable Energy Laboratory to assess the degree to which readily available public data (e.g., address, vintage, size) can produce credible energy estimates. Regardless of those findings, efficiency advocates, including those managing more detailed rating systems, need to figure out how to leverage these efforts in a way that drives investment in residential energy efficiency.

Streamlining Quality Assurance and Training

The costs of training and QA can be reduced by using a flexible approach and relying more heavily on data analytics. Not all professionals learn in the same ways and some individuals specifically prefer in-person training. Several Home Energy Score partners have begun to hold half or full day in-person trainings where a trainer helps groups of candidate assessors through the initial technical aspects of the online training. The in-person training represents an initial up front cost, but can reduce overall implementation costs by speeding adoption. ETO's experience in deploying the EPS label showed in-person trainings were required to put in place a critical number of assessors in year one, but online and webinar trainings were able to meet market needs in later years.

The web-based Home Energy Score technology allows for real time access to assessor records, enabling desk reviews that are less expensive than on site reviews of an assessor's work. This is common practice for partners in conducting QA, but currently 5% of all homes scored must be re-scored with an on-site re-assessment. The QA regimen could be streamlined by relying on standardized data analytics instead of site visits. As an example, ETO relies on monthly review of each EPS assessor's files with automated filters to flag outliers in the data entry. These analytics systems are envisioned as tools that both reduce QA costs and deliver overall higher levels of quality. DOE is working to improve the Home Energy Score data analytics and is testing alternative QA methods that rely more heavily on mentoring than rescoring.

Conclusion

Remarkable progress has been made over the past five years with states, utilities, cities, and real estate stakeholders pioneering residential energy labeling efforts across the country. Residential labels are generated daily, at a pace expected to increase exponentially with more states implementing their scale-up plans. Home Energy Score partners have scored more than 40,000 homes as of May 2016. Collaboration across sectors has been and will continue to be key to this progress, and the circle of collaborators is widening to include appraisers, real estate agents, financial institutions, retailers, and many others. Energy labels have the potential to transform the residential energy efficiency space by capitalizing on homebuyers' willingness to invest at point of sale and giving them the information needed to value energy efficiency in the real estate transaction. The next few years will hopefully show how states and others are conquering the scale-up barriers for residential energy labels, and how they are forging the way to educate homebuyers and homeowners about energy efficiency at every possible chance.

References

Elevate Energy. 2014. **Energy Cost Disclosure in Residential Listings in Chicago: A Preliminary Snapshot** http://www.elevateenergy.org/wp/wp-content/uploads/ECDOrd_Analysis_FINAL.pdf

WIN Home Inspection. *Rising home sales signal growing demand for inspections*. 2015. <http://winfranchising.com/featured/real-estate-trends-2015-favor-win-home-inspection-franchise/>

Acknowledgements The authors are grateful to the following individuals for allowing us to share a summary of their work throughout this paper: Peter Rusin with the Colorado Energy Office, Evan Seretan with United Illuminating, Diane Delrosso with Eversource, Jerry Ryan and Susan Ellman with New Jersey Natural Gas, Terry Freeman with Columbia Water & Light, Paul Grimyser with Focus on Energy, and Shannon Morrow and Brendan Thomas with SEEL.