Residential Building Energy Scoring and Labeling: An Update from Leading States

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ABSTRACT

Efforts to score and label buildings for energy performance have been in place internationally for over 15 years, but only recently have energy labels been designed and implemented in the U.S. for existing homes. This paper provides the current status of efforts to develop and deliver building energy labeling for existing homes in the leading states of Connecticut, Massachusetts, Oregon and Vermont and shares key lessons learned.

Scoring and labeling existing buildings is not straightforward and presents many questions. Should the score be asset-based or operational? Should it present site or source energy, Btus or kilowatt-hours? Should location efficiency or renewable energy be considered? What scale is most intuitive: 1-10, 0-100, A-F? What supplemental data accompanies the score: energy costs, carbon, or improvement recommendations? Which tool generates the score, how is it delivered, what are the costs and who bears them?

This paper presents the pros, cons, resolutions and justifications for the decisions made in designing each state's labeling approach. Comparing and contrasting state approaches to identify common themes and lessons learned provides a useful reference for others considering adopting a residential energy label. We provide recommendations for others looking to make building energy use more transparent through energy labeling.

Introduction

Many countries and a few locations in the United States regularly score and label their existing buildings for energy performance to ensure transparency to buyers, renters, occupants and others. This is one important step toward making energy efficiency visible and enabling markets to begin to truly value building energy performance. Energy scores and labels can quantify investments made in a building's energy efficiency and renewable energy systems, provide information for prospective buyers or renters, and encourage sellers and property owners to invest in efficiency improvements. Energy scores and labels can also provide key information to support time-of-listing/sale disclosure policy initiatives. This paper provides the current status of efforts to develop and deliver residential building energy labeling in the leading states of Connecticut, Massachusetts, Oregon and Vermont.

Background

Many states and programs have been labeling new homes through the Home Energy Rating System[1] (HERS) since the mid-1980s. Vermont issued its first HERS rating in 1987 and, like Connecticut and Massachusetts, has used HERS primarily to qualify new homes for efficiency programs, ENERGY STAR® Homes certification, green building programs and in more recent years as an option for energy code compliance. However, HERS ratings have never been widely used for existing homes, primarily due to the high cost[2] to generate a rating.

About two dozen cities and states have put in place disclosure policies to convey energy information to buyers, renters, building owners, and occupants across all building types. Benchmarking based on past energy bills has been the dominant approach for commercial and multi-family buildings in these jurisdictions (IMT 2014). On the residential side, most of the requirements are for disclosing utility bills or an efficiency checklist, but a few cities such as Austin, Texas require an energy audit. Nowhere in the U.S. is a residential energy label currently required at the time of rental or sale to inform a tenant or buyer of the energy performance of the property.

In 2009, Vice President Biden directed the U.S. Department of Energy (DOE) to develop an existing homes labeling program. The DOE's Home Energy Score, based on a set of simplified inputs and an output of a 1-10 score, is the result of that directive. See Figure 1 for a sample. The Home Energy Score was publically released in summer 2012 after initial piloting efforts, and updated in January 2014.

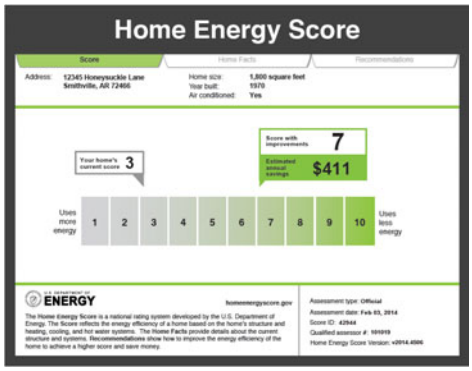

Figure 1. The DOE home energy score.

Largely in parallel to the Federal initiative, a good deal of work has been underway in Connecticut, Massachusetts, Oregon and Vermont to develop and implement residential labeling programs. This paper references those experiences, tackles some of the more important topics addressed in the development of these initiatives and presents the solutions arrived at by each state.

Residential Labeling Activities in Leading States

Energy Trust of Oregon (Energy Trust) was one of the first energy efficiency organizations to implement home energy labeling. In 2007, Energy Trust launched an initial pilot to find an accurate and cost-effective way to calculate and report on home energy performance. This led to the development of the Energy Performance Score (EPS). Energy Trust and its partners have offered the EPS for new construction since mid-2009. Following an existing homes pilot in 2008, Oregon passed legislation in 2009 and 2013 to develop a voluntary statewide approach to energy scoring, and to consider a mandatory scoring system. Energy Trust now has

[1] The HERS or Home Energy Rating System was developed by RESNET and is a nationally recognized system for inspecting and calculating a home's energy performance (RESNET 2014)

[2] According to the U.S. Department of Housing and Urban Development a HERS rating can cost from $300 to $800

over 7,000 scores in the market, including 4,000 on new homes. Oregon is currently rulemaking to establish a structure for assessors to be licensed by the state, scoring vendors to be approved by the state, required metrics for the score, a technical oversight committee and criteria for appraisers to be used by banks for high performance home valuation.

Massachusetts and Vermont tried to pass legislation mandating residential energy disclosure at time of sale in 2008 and 2012, respectively, but were unsuccessful and subsequently shifted to voluntary programs (VT PSD 2012). In Massachusetts, the Department of Energy Resources (DOER) leads the effort to integrate energy scores into statewide energy efficiency programs. Three Massachusetts utilities recently completed a DOE-funded pilot to deliver the EPS scorecard in eight communities. Through February 2014, 3,500 homes had received scorecards and over 1,800 had signed contracts for insulation improvements – a significant increase in conversion rates. In Vermont, legislation passed in 2013 to establish a working group to develop voluntary statewide residential energy labeling. Recommendations to the Vermont legislature were presented in December 2013, and Efficiency Vermont (the state's energy efficiency utility) is now implementing the statewide energy label in collaboration with the state's weatherization agencies, the natural gas utility, and the state Public Service Department.

Connecticut's labeling activities stem from 2011 legislation creating the Department of Energy and Environmental Protection (CT DEEP) and a requirement to weatherize 80% of homes by 2030. Following a voluntary labeling pilot, CT DEEP issued a decision requiring utilities to integrate labeling into the statewide residential retrofit program in 2013. Connecticut selected the DOE Home Energy Score for the state energy label, and are now delivering it through home performance contractors. As of May 2014, there were over 65 qualified assessors in Connecticut and 64 scores had been completed.

Scoring and Labeling Issues

Residential labeling initiatives tend to use different methodologies, approaches and tools than multifamily and commercial buildings.[3] Some of the primary issues and approaches for the residential sector are described in more detail below.

Voluntary vs. Mandatory Disclosure

While about a dozen U.S. cities and states have mandated energy disclosure and benchmarking for large commercial and multifamily buildings, mandatory disclosure is much less common in the residential single-family sector. Although there have been attempts to pass residential disclosure legislation, in most jurisdictions, the real estate and lending communities have quickly mounted successful campaigns raising concerns that inefficient homes will be devalued if the market is made aware of the cost to operate them.

As a result of initial Realtor and lender resistance, all of the states discussed in this paper are now taking a voluntary approach to residential labeling. While Oregon is hoping to raise consumer awareness by offering a label independent of program offerings, Connecticut,

[3] Commercial and multifamily building owners and renters to date have largely relied on operational data, rather than asset data, for energy disclosure

Massachusetts and Vermont are all "piggy-backing" labels onto existing energy efficiency programs as a way to introduce consumers to the labels and seed the market with energy scores. In these three states, energy labels show how a home initially scores at the time of an energy audit and then provide an updated score post-improvement to reflect the energy upgrade impacts. Through voluntary exposure, states hope to make the case that energy labels will help markets work better through additional energy transparency that enables those with more efficient homes to receive a return on their investment.

Metrics, Scores and Scales

The four states discussed in this paper have gone through extensive deliberations to address what metrics best present home energy information in a way that is meaningful and motivational to consumers. The ultimate goals are for consumers to easily understand what the score means and how it compares to other homes' scores, to inform home purchasing decisions, and motivate homeowners to reduce energy consumption.

There are several practical options for presenting a score to consumers. These can be "absolute" (e.g., MMBtu[4]/year) or "normalized" scores, such as taking house size into account (e.g., MMBtu/square foot/year). Translating primary energy into a recognizable 1-10, 1-100, or A-F index is another option. The DOE Home Energy Score uses a 1-10 scale where 10 is best. This score has both the benefit of simplicity and national recognition from its DOE endorsement. However, it has also been argued to be "overly simplistic", and not granular enough to accurately illustrate the impact of efficiency improvements.

While it is clear that there is no "single right answer", Energy Trust, Massachusetts, and Vermont all arrived at a similar conclusion in choosing to use total MMBtu per year per household on a site-energy basis as their primary score. This metric is transparent and durable (i.e. it doesn't change over time unless the conditions of the house itself change). It can be readily presented in a way that allows for comparison with other homes and demonstrates progress down the scale towards "zero net energy". The range of scores for existing homes using this metric is generally between 50 and 150 MMBtu/year, varying somewhat with climate. Vermont went through two rounds of consumer testing, running scores and graphics past 400 homeowners before settling on MMBtu/year, with 0 on the left of a colored wedge as the primary score presentation. Massachusetts conducted extensive interviews with program implementers of residential scoring tools in the European Union and Australia before arriving at the same MMBtu/year metric.

To complement the primary score, various additional metrics such as carbon footprint, annual energy costs and potential costs savings have been incorporated into the states' labels to provide a more complete picture of energy impacts. Each state has chosen to include or exclude information based on feedback from their working groups and/or consumer testing.

The DOE team also used focus groups and other consumer testing to arrive at the Home Energy Score simplified 1-10 scale, which is what Connecticut is now using. Vermont recognized that linking to a DOE-sponsored score could provide some potential future benefits if Congress were to ever pass tax credits, mortgage enhancements or other incentives for

[4] Million British thermal units.

retrofitting U.S. homes and decided to include the DOE Home Energy Score as a secondary metric to supplement the primary MMBtu/year score. Connecticut also recognized the benefit of using a nationally recognized platform, and after much stakeholder input, decided to use the Home Energy Scoring Tool solely without an MMBtu/year score to keep the labeling process simple and easy to comprehend. In deciding to include both metrics, Vermont considered the potential for customer confusion, but received feedback from consumer testing that homeowners could decipher the differences between the two scores if presented in a well-designed label. Vermont and Connecticut also found that the DOE logo added credibility, which was confirmed through focus groups conducted by the Shelton Group (Shelton 2013).

Asset vs. operational. The energy consumption data that feeds a residential score may be based on the "assets" (energy features) of the home, independent of fluctuations in occupancy or weather; or it may be based on "operational" (actual) energy consumption. This is where commercial and large multifamily labeling tends to diverge from single-family residential labeling. To date, commercial and multifamily energy disclosure and labeling efforts in the United States have been based on benchmarking, which utilizes actual consumption data from fuel bills. However, due to the substantial impact of occupancy, behavior and weather patterns on residential energy consumption, and the relative ease of modeling single family homes, an asset-based score provides a more neutral quantification of estimated average energy use in a given home. The DOE Home Energy Score and each of the states' MMBtu/year scores presented in this paper are all asset-based. Multifamily buildings, depending on their size, may fall more appropriately under an asset or an operational approach. This is an issue that many states are grappling with. As the number of units in a residential building increases, it generally gets harder to create a good asset modeling tool, becomes more expensive to produce the score and is easier to find a fair average operational score.

Site vs. source. Scores can be generated based on the energy used at the house "site", without taking any of the extraction, generation, transmission and distribution losses into account, or can be "source" based, considering all primary energy used in the process. The site vs. source argument was probably the most important one that Energy Trust encountered initially but it became clear that site energy makes more sense to most customers. Since the score is about consumer awareness and ease of understanding, Energy Trust uses site-based energy[5] in determining the MMBtu/year score, as do Massachusetts and Vermont. Despite the fact that a site-based score may produce a better score for an electric home than a less-expensive- to-operate gas home, consumers are often confused by source-energy based scores. In Massachusetts and Energy Trust, the secondary metric of carbon emissions provides a tangible alternative to a source-based energy score. Given different public policy considerations, DOE uses a source-energy based metric in the Home Energy Score, but includes potential carbon savings in a companion report. [6]

[5] However, a fuel weighting factor is applied in Energy Trust's score to attempt to make gas and electric scores more equitable because of their fuel neutral mandate as an organization.

[6] The Home Energy Scoring Tool calculates potential carbon reduction savings based on regional emissions factors for electricity and national emissions factors for residential fuels.

Level of granularity. Massachusetts, Energy Trust and Vermont were all interested in having the score show incremental changes in energy performance as homeowners made energy efficiency or renewable investments. An asset-based MMBtu/year score is sufficiently granular[7] to illustrate the impacts of energy efficiency improvements. Connecticut shared this concern; however, they chose not to include the MMBtu metric to keep the scorecard simple and easy to understand. The DOE Home Energy Score used by Connecticut has only 10 bins in which a home's score may fall. As a result, it is more difficult to "move" homes along the scale. Based on feedback received in 2013, DOE made adjustments to their scoring methodology so that the 2014 Home Energy Score would be more responsive to retrofit improvements.[8] For comparison, RESNET's HERS index spans a similar range to the MMBtu/year of 0-150 or so, and the dominant commercial benchmarking tool, ENERGY STAR Portfolio Manager, uses a 0-100 percentile range.

Label Presentation

Label design has been an evolving process for all programs. Energy Trust's initial EPS, first used in 2009, depicted two primary metrics: an "energy" score in (MMBtu/year) and a "carbon" score (Tons/year). Focus groups showed that consumers needed to know which end of the scale was "good" and which was "bad", so they added the words "best" and "worst" on the vertical scale to aide in consumer interpretation. Vermont's consumer testing suggested a need for similar clarification. Another important aspect of the score presentation is having "benchmarks of comparison" on the scale. For Oregon's score, four benchmarks were initially used: 1) U.S. average, 2) Oregon average, 3) home built to code and 4) home with electricity from renewable sources. Vermont's primary label focus is existing homes, so two benchmarks were chosen with the intention of motivating homeowners to improve efficiency: 1) average Vermont home built to energy code and 2) high performance home. The state scale also use color to identify high and low energy use on either ends of the scale. For example, in Vermont low energy use is green, average use is yellow and high use is orange/red.

In addition to the graphic depicting the primary score, Massachusetts, Energy Trust and Vermont all include the estimated annual energy costs, and a breakdown of cost by fuel type on their labels. The DOE Home Energy Score generates a breakdown of estimated site energy use, but rather than put this on the label, it instead emphasizes the recommended energy improvements by highlighting cost savings and the improved score. Vermont's label includes the DOE Home Energy Score as a secondary metric, while Connecticut delivers the standard DOE Home Energy Score label followed by customized recommendations through their Home Energy Solutions program including projected savings, paybacks, and incentive amounts. All labels provide basic information about the house, including address, size and energy features like the presence of renewables.[9] The back page of the score is used to explain the elements of the front,

[7] Generally in the range of 50-150 MMBtu/year.
[8] The 2014 version of the Home Energy Scoring Tool excludes lighting and appliance energy use in the 1-10 score, although a total MMBtu for the house, including these items, is provided in the Score Report as an additional metric.
[9] DOE plans to account for onsite solar energy generation in a future update to the Home Energy Scoring Tool.

including carbon footprint, the benchmarks, energy calculations, who the sponsor is and scoring clarifications such as asset- and site-based.

When Energy Trust launched its score for existing homes, it made improvements to the label based on feedback from market actors and focus groups. These updates included:

- Making the "energy" score of the EPS more prominent, as it was considered confusing that the two bars in their original design didn't convey a singular "score";
- Turning the energy scale visually into a wedge to better represent the volume of higher energy use and help illustrate that less energy is better. (Vermont also used this design after consumer testing confirmed it as the preferred way to convey that less is better);
- Narrowing down the benchmarks to the most relevant, since fewer benchmarks led to easier consumer interpretation;
- Making monthly operating costs more prominent based on focus group feedback. (Vermont also confirmed this in discussions with Realtors); and
- Making the clouds at the higher-carbon end of the scale darker to aid in understanding visually which end of the carbon scale is best.

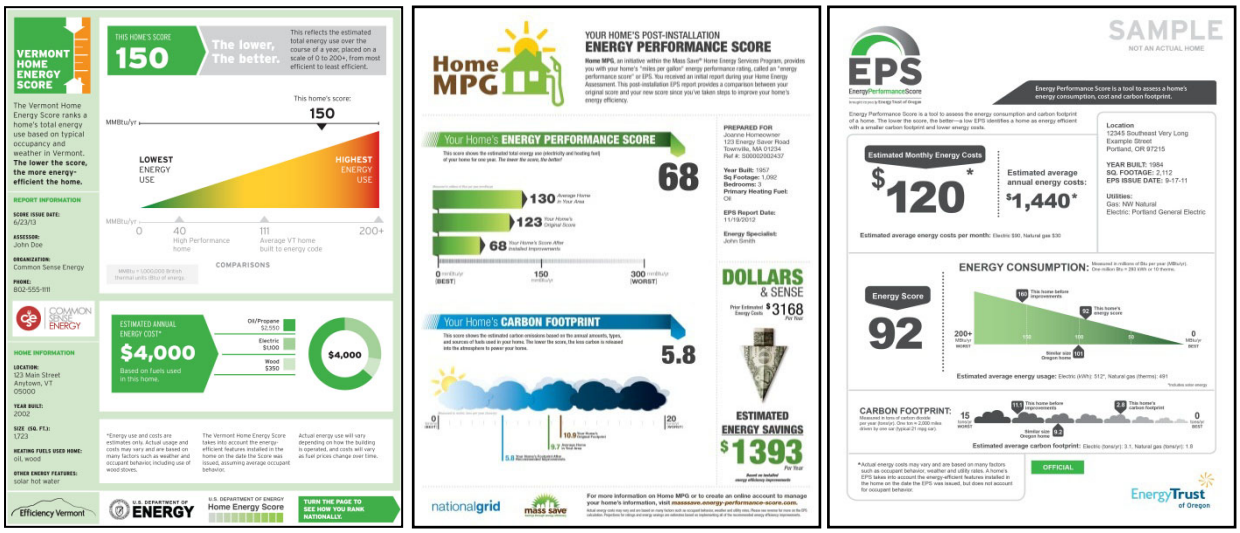

Figure 2. Vermont (draft as of May 2014), Massachusetts, and Energy Trust home energy label examples.

Tools

A number of residential building energy modeling tools are available to generate an asset-based home energy score, ranging in complexity. Each of the states had a number of goals for their scoring programs, some of which were shared across the states, while some rose to a higher level of importance for a given state, leading to different tool selection outcomes. Among the high-level goals were: affordability, ease of data collection and entry, potential for regional and national replicability, compatibility with existing programs and/or tools already in use, confidence in the modeling results, training and/or certification requirements to utilize the tool, and the ability to produce a score that is meaningful and understandable by the market. For Energy Trust, Massachusetts and Vermont, another key consideration arose: selection of a tool

whose developers were open to potential modifications based on input from partners. For all states, a primary concern was selecting a tool that was affordable long-term as future funding for score generation is an unknown. This ruled out certain well-known tools and rating systems, such as HERS, due primarily to the cost and complexity of providing HERS ratings to existing homes.

The following tools were reviewed and analyzed by one or more of the states: EnergyMeasure Home™ (Conservation Services Group), Home Energy Scoring Tool (U.S. DOE), CakeSystems/Simple 2.0 (based on Michael Blasnik's SIMPLE tool), Recurve and REM/*Rate*™ (Architectural Energy Corporation) in Simplified Mode. Tool assessment varied considerably by state. Energy Trust examined a wide range of tools from very simple (32 inputs) to those requiring a higher level of data (125 inputs), whereas Vermont's more recent process focused on tools requiring minimal inputs (50-60 inputs). Energy Trust determined that billing usage data was not a good method to define accuracy due to the influence of behavior on energy consumption. They then sought to explore the efficacy and accuracy of the chosen modeling tools relative to a widely accepted benchmarking tool used in the northwest, Ecotope's Simplified Energy Efficiency Model (SEEM).[10] The results of five tools were compared against three representative prototype buildings modeled in SEEM, each prototype including four different mechanical system/fuel type combinations (EPS 2009). By contrast, in Vermont a sample of 25 representative homes was chosen from a recent existing homes database to populate each of the tools reviewed. Modeled results, by fuel and total energy, were compared to historical energy consumption[11] for each home. In Massachusetts, internal decisions around scoring metrics and implementation shaped the choice of tools. Rather than conducting extensive internal analysis on a selection of tools, Massachusetts referred to the tool analysis conducted by Energy Trust and others. Massachusetts conducted pilot testing of the CakeSystems tool as well as DOE's Home Energy Score. In Connecticut, tools were assessed not only with simplicity, affordability, replicability and existing program compatibility in mind, but also for their ability to help track the state's progress toward a legislatively mandated goal of weatherizing 80% of homes by 2030.

For Energy Trust, the results of their analysis led to a recommendation to use either CakeSystems or EnergyMeasure Home™ to generate acceptable scores in their market. In Vermont, the quantitative testing results of the 25 homes helped guide the final decision, providing a level of confidence in the updated DOE Home Energy Scoring Tool. Ultimately, the DOE tool was chosen in Vermont for a number of reasons, including: reasonable accuracy when compared to actual data on sample homes[12]; ability to generate scores through the on-line interface or from existing audit tools via an API[13]; no cost associated with the tool and API (for non-profit organization partners); ability to generate a total MMBtu/year primary score in addition to the native 1-10 score; and a high potential for replicability with neighboring states. CakeSystems was selected as a good fit with the Massachusetts goals not just for a scorecard, but also for taking a more holistic approach to customer engagement in home energy retrofits. The CakeSystems EPS tool provides an API, and both the CakeSystems and Energy Measure Home

[10] Simplified Energy Efficiency Model (SEEM) http://www.ecotope.com/ssrmar.html
[11] Three year weather normalized averages (fossil fuel) and eight year historic averages (electric) were utilized.
[12] Results are from the Home Energy Scoring Tool v2014 and are much improved over results seen from v2013.
[13] Application Programming Interface

tools used in Massachusetts require less time to gather model inputs than the DOE tool, which was a critical consideration for implementing utilities. With stakeholder input through written comments and public hearings, Connecticut selected the DOE Home Energy Score and its nationally recognized 1 to 10 rating scale, which could effectively complement the more detailed reporting available to consumers through the state's home performance program.

The following are key takeaways from each state's experience testing and/or piloting energy scoring tools:

- More inputs do not necessarily translate into more accurate scores;
- Although different tools were chosen, a common metric (site-based MMBtu/year) is shared across most states and is an output of the DOE Home Energy Scoring Tool;
- Consistency in score generation (i.e. by the same, or very similar, modeling engines) is important within a given region;
- The use of an API allows audit tool data to be loaded in a single common scoring "engine", and is critical for states using more than one audit tool for existing retrofit programs; and
- The ability for an auditor to generate a label when online, or to input data while off-line in the field to generate a label later are both important, especially in rural states.

National Activities Related to Energy Labeling

In addition to state and local efforts to develop residential energy labels, a number of national activities are underway that will help make building energy more transparent and facilitate valuation in the real estate marketplace. These include the Building Performance Institute (BPI) data and certification standards, the Green MLS Implementation Guide, and the Appraisal Institute's Residential Green and Energy Efficient Addendum.

Unlocking the Value of an Energy Efficient Home: A Blueprint to Make Energy Efficiency Improvements Visible in the Real Estate Market, a 2013 paper by CNT Energy (now Elevate Energy) and the National Home Performance Council (now the Home Performance Coalition), connects the dots between the various national standards and lays out the steps that program implementers can take to incorporate energy efficiency improvements into the real estate value chain (CNT 2013). These steps include documenting energy features using consistent methods, including energy data in the appraisal process, working with the MLS community, and offering continuing education and training to Realtors, appraisers, and other real estate professionals.

The paper's recommendations leverage new BPI[14] standards for documenting energy efficiency improvements and collecting and transferring the associated data (BPI 2013a and BPI 2013b). These standards can be adopted by Home Performance with ENERGY STAR programs, Weatherization Assistance Programs (WAPs), and other program implementers to ensure that

[14] Building Performance Institute, www.bpi.org

each home energy audit and improvement project results in a consistent set of data about home energy features and performance, which can then be included in real estate transactions and appraisals.

BPI-2100 (HPXML) provides requirements for an extensible mark-up language (XML) standard data transfer protocol that can be used to transfer home performance-related data between any party involved in a home performance program, including contractors, program administrators, utilities, federal agencies, MLS, and appraisers. BPI-2200 facilitates information exchange among all actors in the home performance industry by providing a standard vocabulary for terms related to buildings, energy consumption, and energy conservation measures (BPI 2013b). BPI-2101 identifies a standard set of data elements for certificates that document the completion of a whole-house energy upgrade or individual energy measures in existing homes. A certificate that complies with the requirements of this standard can be issued to homeowners by programs or third-party quality assurance providers for inclusion in the MLS home re-sale process (BPI 2013a).

The CNT paper's recommendations also build on the Appraisal Institute's Residential Green and Energy Efficient Addendum, which allows appraisers to characterize and quantify a home's green and energy-efficient features (AI 2013). This begins to capture the value of energy efficiency in the appraisal process. This addendum can also be pre-filled by an energy auditor as part of a home energy audit or improvement project and then provided to the appraiser.

These efforts are supported by the Green MLS[15] Implementation Guide v 1.0, which was released in May 2014 (NAR 2014). The Guide provides a blueprint to implement Green MLS fields that comply with the Real Estate Transaction Standard (RETS) Data Dictionary. It provides a library of terms related to green and energy-efficient building in order to standardize language in MLS systems throughout the country. A home's energy features and certifications can then be consistently described by any MLS system that adopts this standard set of terms.

State Activities to Value Homes in the Real Estate Market

Several states are implementing steps to "unlock the value of an energy efficient home" by making energy performance information available during real estate transactions. Vermont plans to align with national standards, including the BPI HPXML and certificate standards, as it implements its home energy label, so that energy information can flow through the real estate value chain.

The first and arguably most important step in this process is to ensure that the energy score, and other relevant label information, is captured in the local MLS. This service is used by home sellers, buyers, real estate agents, lenders, appraisers, home inspectors and others, so it is critical to get the label information into this database. Unfortunately, it is not as simple as working with a single entity to make this happen as there are "hundreds"[16] of independent MLS systems. Vermont and Energy Trust have coordinated extensively with their local MLS

[15] Multiple Listing Service, the regional internet-based database of homes for sale.
[16] http://en.wikipedia.org/wiki/National_Association_of_Realtors

administrators. This experience has been positive; the MLS systems are interested in keeping current with technology and market trends, and have been willing to add energy-related data fields and supporting information.

The MLS administrator serving Vermont and New Hampshire has agreed to include the HERS Index rating for new homes and MMBtu/year energy scores for existing homes, as well as past utility bills, and updated "coded features" to better describe the energy characteristics of all homes. Training in support of this new information will be needed so that Realtors understand what these new fields are and where to obtain the data. This will help avoid what currently occurs periodically in Vermont, where a "0" is entered in the "HERS Index" MLS field when there is no HERS rating for that house, which makes it seem like a net zero energy home.

Energy Trust has worked with the metro Portland MLS system to upload the energy label directly. The MLS is programmed to take in a HERS, Home Energy Score or EPS value and then upload the "certificate" that includes that score. Most recently, Oregon has focused on educating the real estate community on including the EPS information when doing a listing, as well as uploading the EPS certificate to the MLS record.

Energy Trust, and more recently Massachusetts, also offer regular trainings to real estate professionals to impart the knowledge and skills to communicate the value and benefits of a new or remodeled green home. Energy Trust also offers cooperative marketing dollars and use of their logo to support the subset of Realtors that seek to differentiate themselves as "green" or sustainable. In addition, Oregon has worked actively with the appraisal community to develop a green features addendum, which is an optional worksheet to support the valuation of energy efficiency and other green features.

Conclusions

The experiences from Connecticut, Massachusetts, Energy Trust and Vermont provide valuable lessons and examples for others to reference as they advance home energy labeling initiatives, including:

- *Take a multi-pronged approach*: While certainly useful, just providing an energy label is not sufficient if the goal is to make energy visible and actionable in housing transactions. In order to provide transparent and valuable energy information to homeowners, buyers, renters, sellers and the real estate industry, a multi-pronged approach is most effective, including the following four aspects:

    1. Developing and making available a voluntary energy score and label that can be displayed within the MLS;
    2. Describing the energy features of the home accurately in the MLS system;
    3. Disclosing previous utility bills as part of home rental, sales and purchases; and
    4. Recognizing energy efficiency achievement with certifications that conform to national guidelines so that they may be included in the MLS and used with existing appraisal and underwriting tools.

- *Start with voluntary labeling*: Launch the initiative as a voluntary one in order to test the approach and address problems, familiarize the real estate market with the label, work through the MLS and data issues, and avoid any unwelcome opposition.
- *Integrate with residential retrofit programs:* Integrating with existing programs enables label delivery to consumers with little or no additional cost, while also providing a path for energy efficient upgrades to those motivated to improve a score. By using an API, labels can be generated by multiple audit software programs, such as those commonly used by utility and low-income weatherization programs.
- *Determine the threshold between single-family and multifamily:* Since single-family labeling approaches tend to be asset-based and commercial and large multifamily approaches tend to be operational-based, integrating the two is a challenge.
- *Consider using MMBtu/year as the primary metric:* Site-based MMBtu/year has some real advantages as a metric and seems to be gaining national traction.
- *Select consistent tools:* To enable consistent scores throughout a state, if possible, it is desirable to use one scoring engine regardless of the auditing model being used to generate the score and label. This can be accomplished through the use of HPXML and APIs to transfer energy data between different energy audit and scoring software.
- *Align with national data standards:* Work with local MLS administrators to incorporate the national BPI, Appraisal Institute and MLS data standards to ensure that program data is in a format that can easily and consistently transfer between systems.
- *Coordinate with stakeholders and set up a governance structure*: In order to ensure statewide and even regional consistency, programs need to develop a governance structure for ongoing coordination. Programs also need to collaborate with real estate industry stakeholders to enlist buy-in and find common ground. At the national level, DOE is very interested in rolling out the Home Energy Score, and is willing to work with states to address their individual needs.
- *Offer training*: Training is needed to ensure that the real estate and lending communities understand the energy label and are able to explain the score and other features to customers and input data correctly into the MLS system. Offering continuing education credits for the trainings can be a win-win proposition for the program and the trainees.

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