
HOME ENERGY LABELS

A POLICY PLAYBOOK

A collaborative project for the Pacific Northwest

PREPARED BY EARTH ADVANTAGE WITH THE SUPPORT OF

Bullitt Foundation



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About Earth Advantage

Earth Advantage is a Portland-based nonprofit whose mission is to accelerate the creation of better buildings. We provide knowledge to building professionals and information to consumers through certification, research, education, and product development to move the building industry towards more sustainable practices.

Learn more at earthadvantage.org

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Earth Advantage's History with Energy Labeling and Disclosure

We put transparency first.

Remaining open about our activities is critical to building trust.

Earth Advantage recognizes the power of transparency as one of the organization's core values. Given the importance of organizational transparency, detailing Earth Advantage's multi-faceted involvement with residential energy scoring and disclosure will give readers a sense of the experience and perspective that inspired the development of this policy playbook.

Earth Advantage began work with Energy Trust of Oregon on developing a residential energy score in 2007. The team, which included Earth Advantage, PECCI, Energy Trust, and Conservation Services Group staff, delivered a 300 home pilot project that tested a newly conceived Energy Performance Score (EPS) label. Earth Advantage researched and designed the EPS metric for existing home and also undertook testing of several home energy modeling software tools.

Earth Advantage then embarked on an effort to develop a cost effective way to conduct home energy assessments, assign them energy scores, and assess the potential impacts of energy upgrades. The result was the creation of a software platform, now called CakeSystems, that is used by utility programs and independent energy assessors to generate energy scores on existing homes, amongst providing numerous other program management functionalities.

In 2010, Earth Advantage began working with the city of Seattle to deliver EPS labels for existing homes, and shortly thereafter began delivering software services and EPS labels to targeted markets in Virginia, Alabama, and Washington states. At that time, Earth Advantage also joined a group of the nation's leading energy efficiency organizations and software providers in drafting the first policy white paper on proposed national technical and administrative standards for home energy scoring. In

2011, Earth Advantage initiated research in partnership with Lawrence Berkeley National Laboratory and Portland State University to assess the impacts that energy labels had on homeowner energy upgrade decision-making¹. In 2014, Earth Advantage co-hosted a national summit on energy labeling led by the National Association of State Energy Officials (NASEO) and attended by directors and staff of twelve state energy offices².

Not surprisingly, due to the many years of research, testing, and deployment of energy scoring programs and systems, the Earth Advantage team has developed opinions and perspectives about some of the most effective approaches to energy labeling policy and program implementation. In undertaking the interviews and discussion groups for this policy playbook, Earth Advantage - and the entire project team - took great pains to limit the influence of any preconceptions we have developed from prior experiences. We have collectively sought to engage in the research for this policy playbook with “fresh eyes”.

¹ Behavioral Perspectives on Home Energy Audits: The role of auditors, labels, reports and audit tools on homeowner decision-making <http://www.earthadvantage.org/assets/documents/BehavioralPerspectivesHomeEnergyAudits-120720-v9.pdf>

² Residential Energy Labeling: Strategies for Scalability <http://www.naseo.org/residential-energy-labeling>

Key Terms

Energy Score means one specific, primary energy performance metric. (Sometimes also referred to as an Energy Rating)

Energy Label means a usually one-page document that portrays information and key metrics related to the energy performance of a home, and which includes the Energy Score.

Energy Report means a document that may accompany the Energy Label, and which provides more detail about the home including specific recommendations for energy improvements.

Further definitions can be found in Appendix A.

Executive Summary

The Pacific Northwest is a national leader in testing and implementing residential energy labeling programs. Yet even in those Pacific Northwest areas where voluntary residential energy scores are being made available to homeowners and gradually to the real estate transaction market, programs for new and existing homes are sometimes using differing standards, rules, methodologies, and terminologies. A more understandable and regionally consistent energy labeling and disclosure protocol will support both consumers and key industry professionals such as builders, appraisers, home performance contractors, and Realtors, amongst others. Because real estate markets are by their very nature local, this regional approach is both the most practical and the most relevant means of implementing an effective energy labeling system.

As part of a Bullitt Foundation-initiated project aimed at developing technical, administrative, and marketing best practices in residential energy labeling and disclosure, a project team led by Earth Advantage conducted dozens of interviews and roundtable sessions with key industry stakeholders in the home building, real estate, lending and appraising, home performance contracting, and remodeling industries in Oregon and Washington. Concurrently, the creation, debate, passing, and rulemaking related to Oregon House Bill 2801 (HB2801) from mid-2013 to mid-2014 presented the project team with a valuable forum in which to dive even deeper into technical and administrative issues related to crafting policy to create an effective energy labeling program³. The experience in Oregon with HB2801 highlighted the many diverse interests that energy labeling policymakers must consider, as well as some technical and political challenges.



The almost two year-long dialogue—both within and outside of the legislative process—uncovered regional perceptions of current residential energy scoring and disclosure systems, future potential of market and consumer receptivity, and the policy and programmatic features required for a successful market-based solution. In seeking input on the key questions of *what kind* of energy information should be provided to the market, and *when* and *by whom* that information should be provided, several key uniformly agreed to themes emerged. At the most basic level, a residential energy labeling program must include the following:

1. Objective information

People support the idea of providing the market with precise metrics related to the estimated energy use and energy costs of a home. There are some stakeholders who support the potential use of energy data taken from actual homeowner utility bills, yet most feel that while this information could potentially be used as supporting data for interested consumers (e.g. homebuyers), it is important to provide energy information that corresponds to a home's energy performance irrespective of occupant behavior.

Real estate industry stakeholder: *“Don't rely on utility bills or calculations that can't adjust for the fact that different homeowners behave differently, have different occupancy patterns, and have differing numbers of people living in the home. Use an objective performance test to determine the potential energy cost of that home.”*

³ <http://www.oregon.gov/energy/pages/rulemaking-eps.aspx>

50%

Of Portland Metro residents would be willing to pay more for a house if it had a better energy score.



Source: Portland Metropolitan Association of REALTORS®

Numerous stakeholders highlighted *use cases* that either require or benefit from performance data that is generated through modeled energy savings calculations, energy scores with enough granularity to delineate distinctions between homes, and scorecards with utility-specific fuel price information. The *use cases* cited in these specific discussions included newly constructed homes, existing homes in which the homeowner continued to reside in the home, homes requiring appraisals for valuation, and homebuyers or homeowners seeking favorable loan terms.

Many stakeholders stressed the importance of energy scores based on objective, precise information. In our discussions, stakeholders often made this case by referencing what they deem to be the somewhat subjective information produced through other real estate activities, such as home inspections and even some appraisals. To be successful, stakeholders believe that energy labeling programs need to produce credible, clearly objective results that can be replicated irrespective of which trained professional is producing them.

2. Consistent information

The ability to deliver consistent information is critical. Regional stakeholders emphasized the importance of consistent home energy information in order to effectively compare homes. There are three main requirements for a scoring system to be considered consistent:

1. Geographic consistency: scoring methodology remains consistent across utility districts, political boundaries, or climate zones.
2. Rater and assessor repeatability: similar results are produced regardless of the individual trained professional who is generating the score.
3. Consistency over time: scores generated in year X are generated using the same methodologies as in year Y.

What constitutes a consistent metric is also a key topic that requires definition. While many stakeholders recommend that scorecards highlight estimated energy cost information because of its resonance with consumers, most of these same stakeholders also recognize that this information is not helpful in reaching other broader policy or market objectives. Some note that rate differences between utilities make comparisons between homes in neighboring utility territories difficult during the valuation process. Some also observe that an energy cost metric could potentially change over time as utilities alter their rates, making comparisons between homes difficult and the metric quickly obsolete. In the end, we recommend that both energy cost information and specific estimated energy usage information be part of an energy label, thereby addressing both the

consumer's interest (energy cost) and appraisal industry's needs (consistent data of the energy performance of a home irrespective of other variables).

Appraisal industry stakeholder: *“Appraisers can't force the market, they have to follow it and reflect it with their appraisals. To do this they use the available data. With energy in homes, they just need more data. This is where energy scoring comes in... it can be the data source for valuing more energy efficient homes. But the data needs to be detailed enough and consistent over time so that it can be useful in comparing homes.”*

In discussions with regional industry groups, those building professionals with experience using rating indices such as RESNET's HERS index expressed reservations about the lack of consistency in these formats. Several regional stakeholders argue that certain types or sizes of homes are penalized (or inappropriately advantaged) under these systems. Others stress that because index baselines are altered periodically it is unclear whether the performance of two homes rated in different years can be accurately compared.



Home building industry stakeholder: *“An index that uses a context that has the potential to change over time doesn't help in creating consistency. It's fine for code compliance because that's a one-time deal, fixed in time. But it's not great for a home buyer or appraiser comparing two homes to one another when one home got a score under one set of index assumptions and another got scored under a different set of index assumptions. It has the potential to be really problematic long-term.”*

A vast majority of industry professionals agree it is counterproductive to promote multiple energy labeling brands or differing metrics within a local or regional market. Almost uniformly, these stakeholders feel that a score's name, terminologies, and consumer-facing metrics should be as consistent as feasible across local or regional political boundaries and utility territories, thereby supporting the market's understanding and interest in energy scoring.

Lending industry stakeholder: *“Scale and volume is important and is what banks look for. One key thing about a score is uniformity of rules and terminologies. It can't change by local market area. Bank executives want uniformity otherwise the size of the lending opportunity will be diminished.”*

3. Affordability

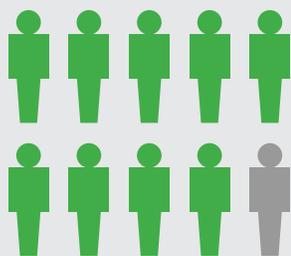
Labeling programs have costs associated with initial development and

long-term implementation. Some policymakers stressed the need to make cost/benefit judgments as part of their decision process before starting these programs. At current costs, subsidizing the total cost of energy labels for existing residential buildings could cost public or private entities a substantial amount. This is especially true in circumstances in which an energy label was to be required as part of a real estate transaction. Because this research focused exclusively on voluntary energy labeling scenarios, the question of the cost (and potential benefits) of a mandatory energy labeling policy is outside the scope of this playbook.

In the current voluntary market, stakeholders interviewed across the region agreed that energy labels should be delivered at a reasonable cost to the homeowner. A cost of \$0 to \$300 based on market conditions and subsidy options was a range deemed both typical and acceptable. Existing voluntary energy labeling programs, such as Energy Trust of Oregon's EPS for existing homes, have created a viable market-based value proposition in which energy assessors or home performance contractors chose to add an energy scoring service into their traditional services for customers. Some stakeholders pointed out that residential energy labeling is part of market transformation efforts and therefore it made sense for utilities and governments to invest in establishing a program as a key element in a broader strategy focused on improving energy efficiency in existing homes. There was some agreement that over time, energy scores would become more commonplace and other market forces (e.g., real estate transactions) will allow program implementers to reduce their investments in marketing or promoting the system.

**NINE
OUT OF
TEN**

Homeowners
care about energy
efficiency



Source: National Association
of Home Builders

4. Consumer Awareness

The three prior stakeholder themes – objective, consistent, affordable energy information – support the fourth theme: the need to shape an energy label that strengthens consumer interest and literacy in the energy performance of homes. Stakeholders across all industries vocalized the need for a local or regional energy label that clearly conveys its rationale and how consumers can use it to their benefit. Some stakeholders give food nutritional information as an example of an effective label in which fairly complex data and arcane terms are provided in a summarized, comparative, and uniform format across multiple product types. These and other stakeholders stress that in order to be effective, an energy label must provide uniformly organized summary data (such as estimated energy usage, energy cost, and carbon impact) and clear ways for consumers to identify and apply the specific metric that is most important or relevant to them. Because real estate is largely a local or regional industry, the consistency

and uniformity of an energy label should be considered in this context.

Home performance contracting stakeholder: *“We need a scorecard that has information that clearly states why consumers should care about their energy score.”*

Home building industry stakeholder: *“What is the grand “why” of energy score information? This needs to be clearly articulated in policy and, more importantly, on consumer-facing materials.”*

Real estate Industry stakeholder: *“There needs to be a marketing effort that explains why an energy efficient house is a higher price potentially and how a score impacts that price.”*



The Path Forward

With those preceding principles in mind, this policy playbook seeks to outline a more detailed structure for developing energy labeling systems that fits the Pacific Northwest market. The regional residential market – both consumers and industry stakeholders – could benefit from a system that provides greater consistency and clarity. The project team considered the unique market characteristics of the Pacific Northwest, including among many other things, real estate trends, consumer preferences, and the insight of the area’s industry representatives.

By collaborating with key industry segments, this energy labeling and disclosure policy playbook formulates a “rules of the road” document that takes into account the needs and constraints of the market. The development of this playbook seeks to improve the efficacy of a voluntary regional framework through the lens of key industries, including, but not limited to: real estate, appraising, new home construction, remodeling contracting, and home performance contracting and energy auditing.

We sincerely hope that the contents of this playbook will serve as the building blocks for the effective use of residential energy labeling as a means to accurately value energy efficiency in real estate transactions and spur investment in residential energy efficiency. At a minimum, this playbook for voluntary regional energy labeling and disclosure provides needed clarity and consistency in how to consider new policy options or update existing ones, such as Oregon’s HB2801.



HOME ENERGY LABELS A POLICY PLAYBOOK

The Playbook

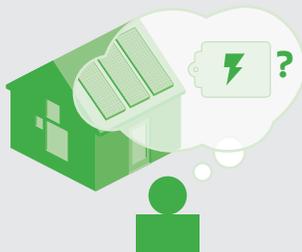
Introduction

As local and state governments craft policy approaches to reduce carbon emissions in the built environment, one particular approach that has yielded interest in both the commercial and residential sectors is energy labeling and disclosure. While commercial building policies being implemented in an increasing number of U.S. cities have generally utilized one methodology and focused on mandatory requirements for building owners, residential systems are a medley of pilot programs utilizing multiple methodologies, terminologies, and voluntary disclosure.

This playbook seeks to serve the needs of policy makers and program implementers, both of whom need to think with long-term perspectives when considering the development of home energy labeling efforts, especially in early design

70%

Of homeowners considering energy retrofits would find an energy label useful.



95%

Of homeowners familiar with energy labels want to see them when they buy a home.



82%

Of homeowners with energy labels would list them when they sell their home.



Source: Lawrence Berkeley National Laboratory

stages. Those considering a residential energy labeling program should have an understanding of the requirements for long-term funding, staffing, and technical resources. Policies that integrate local support and market capacity to manage and operate residential energy labeling programs will have less risk with regard to long-term program durability.

Why consider home energy labeling policy

The motivation and measure of success for an energy labeling program usually falls into three categories:

1. The ability for the information contained on an energy label to influence energy upgrade buying decisions.
2. The ability for the information contained on an energy label to allow homebuyers to understand the energy performance of homes they are considering for purchase. This could be in comparing different homes to one another or as a measure of one specific home's potential for improvement.
3. The ability for specific information contained on an energy label to inform the appraisal industry during the home valuation process.

Although there are compelling results from numerous energy efficiency programs that have integrated energy labeling into their customer delivery, based on preliminary research it is still unclear whether there is a direct causal link between a homeowner receiving an energy label and that homeowner being more likely to engage in an energy upgrade. However, whether or not energy labels directly resulted in higher program conversion rates (e.g., a measurement of the number of energy assessments that resulted in actual energy upgrades), they could very well play an important role in unlocking the power of the market by creating a natural occurring financial incentive for consumers to consider the energy effectiveness of a home.

Policy makers and those in the clean energy industry recognize that the real estate transaction market has limited means to compare the energy performance of different homes. Home energy labeling policy, when properly designed, allows the consumer to make a comparison between two "products". Transparency of information related to the costs associated with operating a home has been sorely lacking in home purchase decisions. It is true that even with energy performance information available, in the short term many consumers will continue to

make decisions based on many other variables. However, energy labeling policies increase the energy literacy of consumers over time and the recognition of home energy performance will more easily be measured.

What will pique any consumer's interest—whether they are concerned with energy efficiency or not—is the potential for the market to value higher performing homes more than standard homes during the home appraisal process. However, in order for higher energy performing homes to be accurately valued, appraisers need the information to determine with some degree of specificity how the energy performance of various homes differ, regardless of who lives in the home. A well-designed energy label with a granular enough energy score metric that can be accessed and used for appraisal comparisons has the potential to help unlock additional value in these homes. The result will be a better informed real estate market that can independently incent builders and consumers to invest in energy effective design and improvements.

Asset vs. Operational Scores

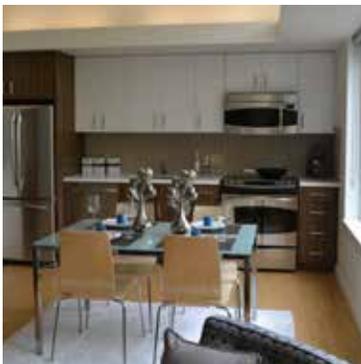
Almost of all of the industry leaders who have started a home energy labeling program, including those in the Pacific Northwest, have adopted energy scores based on the technical assessment of the “asset” (e.g. the structure and key energy-related components of a home). The primary alternative to the asset-based approach to generating energy scores relies on historic energy consumption at each home and is referred to as “operational” scores.

It is important to define the difference between these two very different scoring approaches. An asset-based score is one that is based on the features of the home (e.g. mechanical systems, insulation, etc.) assuming average occupancy based on bedroom counts, thermostat settings, and localized historical weather data. An operational-based score uses the actual energy consumption of a home. This approach is based on not only the home's energy performance but also the occupants' behavior, which changes independently of the building's intrinsic qualities (thermal efficacy of the home's “shell” and mechanical systems).

Therefore, an asset-based score remains steady over time regardless of who lives in the home, unless some energy related improvements have occurred. An operational score will change as the energy consumption of the home changes. An asset score is the most useful way to allow for accurate comparisons between two homes based on predictive performance. For the valuation industry, an asset-based score can be used more effectively to determine if a home should

be appraised at a higher value based on its better energy performance because a better asset score is solely based on a building's component features.

Asset-based energy scores use building energy assessment software to compare a specific building's intrinsic energy-related components to the intrinsic energy-related components of another building. These types of scoring systems also predict the total energy consumption of the home based on known, salient characteristics of the house, and uniform assumptions about the number and behavior of the occupants of the home. Therefore, the energy score is either accompanied by the predicted energy consumption or that annual consumption can be derived from the score. This can be compared with utility information about consumption if it is available, much like the EPA's miles per gallon (MPG) estimates for a car can be compared to actual MPG figures tracked by a driver.



Code compliance vs. energy scores

While considering energy labeling policy, it is worthwhile first defining the purpose of the policy. Some existing energy labeling systems, such as the Home Energy Rating System (HERS) scale from RESNET, are being used as a code compliance tool by numerous local and state governments. For example, the city of Fayetteville, Arkansas requires the posting of a HERS index score on new homes as part of their adoption of the 2009 International Energy Conservation Code (IECC). The city of Santa Fe, New Mexico requires not only the posting of a HERS score as part of the city's residential green building code, but also requires specific HERS scores be achieved dependent on the size of the new home. In addition, HERS has been allowed as a means for achieving the compliance path for new homes in the 2015 International Energy Conservation Code (IECC).

The index is well suited to ensure code compliance in the new construction market, but currently appears less well suited to serve the existing homes market or provide consistent metrics for real estate comparison across different years. An energy labeling policy that seeks to create a uniform metric for both new and existing homes and that remains stable for use by real estate professionals over time is essential. While HERS is used quite frequently for labeling newly constructed homes in the U.S. where the HERS methodology is widely used within above code efficiency programs, it is less popular in the Pacific Northwest. In general HERS is not a viable option for existing homes given cost considerations and because utility existing home efficiency programs have not seen many benefits from utilizing HERS methodology. In part this is due to providers having challenges with reliably calculating energy consumption information in existing homes,

as well as because the HERS system is expensive to implement on older homes. Producing consistent information over time is a challenge for indexed scores because the underlying definition of what constitutes a baseline or comparable home often changes. From a policy perspective, the lack of consistent information over time undermines one of the key rationales for undertaking energy labeling: to support the appraisal industry in making accurate valuations of energy efficient homes.

However, the HERS index and its related rating infrastructure of software and trained professionals can be integrated into a comprehensive residential energy labeling policy, especially if a policy defines a “score” through a basic metric such as MBtu/year. If an energy labeling program uses the MBtu/year metric as the primary, official “score” for both new and existing homes, this metric can be pulled from within the HERS analysis and used on a program’s label so that a homebuyer, appraiser, etc. can easily make comparison with older homes that have also received a score using modeling software better suited to existing homes. This process is similar to what is currently occurring in Energy Trust’s EPS program.

There are some other current attempts being made in different parts of the U.S. to translate the HERS index (150 – 0) and the US DOE’s Home Energy Score (1-10) into a single format that allows comparison between new and existing homes. In some locations, policy makers are testing simple designations of either gold or silver if a home reaches pre-defined HERS index or HES scores. While perhaps helpful to consumers with very limited needs for energy information, the simplified gold/silver designation does not provide much differentiation between performance levels and cannot be readily used by the appraisal industry to accurately compare and value the relative energy performance of homes.

I. The Energy Label

A. KEY ATTRIBUTES OF A LABEL

An energy performance label will be most effective if certain attributes are included. An energy label should be:

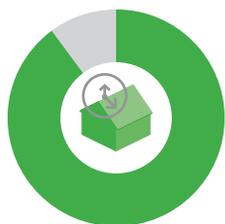
- » Meaningful in different contexts and for an array of consumers and professionals.
- » Applicable to new and existing homes so that comparisons can be made between homes during the real estate transaction process.
- » Useful for indicating progress toward individual and community energy goals.
- » Helpful to homeowners as a baseline against which to evaluate their own energy use and impact of home performance improvements.
- » Consistent over time, so that a score generated in one year can be accurately compared with a score generated in a different year.
- » Granular enough for the appraisal industry to differentiate between home energy performance levels.
- » Relevant to local, state, or regional characteristics, such as common fuels used, literacy and acceptance of carbon reduction, etc.

B. AUDIENCE

There are challenges in producing a single energy label for both new and existing homes. Though there are clearly many overlapping elements between the two, new and existing home markets are distinct in their energy assessment processes, the industry professionals involved in energy-related work, and the software and rating infrastructure that has grown over the last decade.

In several states around the nation where energy labels are currently being considered or implemented, there is a divide between the types of energy scores being produced for new construction and the scores being created for existing homes. In some states with various voluntary programs, a HERS index is used for new homes, while a different metric (MBtu/year, 1-10, etc.) is used for existing homes. A homebuyer shopping for both new and existing homes would experience two different systems that cannot be compared to one another. This complication also leads to confusion for real estate professionals, who are key sources of information and validation about the relative value of higher energy performing homes.

A truly effective policy must integrate both new and existing housing to ensure that homebuyers and the real estate transaction market are able to effectively compare homes across a given geography. Below, we recommend approaches that allow for both new and



90%

OF U.S. HOMES
ARE 40 YEARS
OLD OR MORE.

existing homes to be contained within one programmatic format.

A second important audience consideration for policy makers when designing and conceiving of an energy labeling program is addressing both the information needs of a homeowner doing improvements and the homebuyer seeking an understanding of the energy performance across potentially several home buying options. These consumers will inevitably be in contact with energy labels through various processes, in different contexts, with different purposes, and with varying degrees of energy literacy or interest.

Creating a label that serves these multiple needs can be challenging. But with several years of experience, market testing, and modifications, there are a number of examples of energy labels that appear to be effective conveyors of key energy information for a range of contexts and use types. As an example, Energy Trust of Oregon's EPS is used for both new and existing homes with a common MBtu/yr metric as well as a common display of projected energy costs. The state of Vermont is also using MBtu/yr as their primary energy consumption metric, though they address the potential needs of the "low information" consumer by adding a 1-10 score as a secondary tier of information. For those consumers seeking an "at a glance" sense of the home's performance, this 1-10 score can serve as a means to convey a minimum amount of information. See Appendix C for examples of these and other labels.



As part of this playbook, we provide minimum data sets that are recommended for inclusion on energy labels, regardless of the program implementer or target audience. While this minimum data and information is key to the energy label's utility with consumers and industry professionals alike, flexibility of the label's actual design is also recommended. Policymakers should remain cognizant that additional information beyond the minimum data set is likely to be desired for marketing purposes.

To take an example from nutritional labels on food packages: a consistent portrayal of information on the side of the package is helpful. Yet there is an advantage to allowing marketers to call-out key metrics or simplify information on the "front of the box". Likewise, for energy labels there may be audiences for which a program implementer may choose to emphasize a certain message or metric. As long as the designation and definition of the "official" energy score is clear and accessible to both consumers and real estate professionals, the fundamental purpose for energy labeling policy will be served through some flexibility in presentation.

C. ENERGY LABEL FORMAT

An energy label, as defined in this playbook, is a distinct document from an

energy assessment report (e.g. audit report). Because many considerations need to be weighed when determining what goes onto an energy label, policymakers should define certain elements of the label, including a minimum set of metrics. In this way, program implementers are able to present and format this information in a manner they deem best suits their needs and the needs of their local constituents or customers.

Rather than dictating a specific scorecard layout and graphics, we recommend that policy makers determine specific and clear standards for what information and metrics are required on the scorecard. Individual energy efficiency program implementers within the relevant jurisdiction can make marketing and design decisions that they think will be most effective.

While the preferred policy approach for formatting an energy label would allow for considerable latitude and flexibility in graphic design choices, font size, etc., the actual size of the label requires more regulatory attention. Because Realtors are already uploading energy labels to their local MLS systems in many key Pacific Northwest markets, the label size and length should be defined and constrained to one-sided, one-page formats. This format will allow the Realtors to easily capture all the pertinent information contained on the energy label via smart-phone camera and then more easily upload the image directly to the MLS. If an energy label is not kept to a one-sided, one-page format, key energy information could be lost and unavailable to homebuyers, appraisers, and other brokers, limiting the effectiveness of the energy labeling policy considerably.

The following is a minimum set of information and metrics that should be included on all energy labels produced in the Pacific Northwest

Minimum data set

Introductory Statement

Because most consumers are unclear what a home energy label is or does, a brief introductory statement is important for conveying the relevance of the information. Ideally, this introductory statement articulates the benefits and value of the information on the label to the consumer.

Example: *This score measures and rates the energy consumption, the cost to operate, and the carbon footprint of a home. The lower the score the better – a home with a lower score is a home that is energy efficient with a smaller carbon footprint and lower energy costs.*

Basic Home Information

The following basic home information should be contained on all energy labels:

- » Location address
- » Year built
- » Square footage

Minimum Administrative Information:

The following basic information should be contained on all energy labels:

- » Authorizing agency responsible for the energy label policy.
- » Score issue date
- » Building assessment software name and version
- » Home Energy Assessor
 - » Assessor name
 - » Company name
 - » Phone number
 - » CCB #

Minimum Set of Metrics

- » Total estimated annual energy use represented in MBtu.

For existing homes, graphically represent the subject home in comparison to the following home types:

- » Highest energy use home (worst)
- » Lowest energy use home (best)
- » Average energy use home of similar size and in same climate zone

For new homes, graphically represent the subject home in comparison to the following home types:

- » Highest energy use home (worst)
- » Lowest energy use home (best)
- » Home built to state or local energy code
- » Average energy use home of similar size and in same climate zone

- » Estimated annual energy use in retail units of energy by fuel type.
- » Estimated total monthly and annual cost of energy purchased for the home in dollars, by fuel type, based on the current average annual retail energy price of the utility serving the home.
- » Estimated annual carbon footprint by fuel type for new and existing homes.
- » Estimated total annual energy generated by on-site solar electric, wind electric, hydroelectric, and solar water heating systems in retail units of energy, by type of fuel displaced by the generation.
- » The current average annual utility retail price in dollars, by fuel type, used to determine the monthly and annual cost of energy.

Energy labeling programs that have progressed from pilot testing to full implementation—such as Energy Trust’s EPS—have had an evolution of label designs based on consumer surveys and focus group testing. The result is a more refined visual depiction of a home’s energy information and comparisons between homes. Program implementers should be allowed flexibility to present and update this information in a way that they believe will resonate with their stakeholders and customer base.

Because the energy cost metric is the most immediately understood by consumers and real estate professionals alike, it will be tempting for policy makers to make this the primary metric on an energy label. While this metric can be highlighted visually on an energy label, it should be clear to users that it is not the “official” energy score. Given that energy prices change over time, relying on energy cost per year would result in a score that would change over time. This outcome does not provide the kind of consistent data point needed for the real estate transaction market to accurately compare and assess the relative value the energy performance of a home.

D. ENERGY SCORE GRANULARITY & UNITS

The use of the MBtu/year metric appears to be gaining acceptance and emerging as the primary unit for delineating an official energy score on a residential energy label, particularly in the Pacific Northwest. There was strong agreement from the stakeholder participants that MBtu/year is a foundational metric from which other metrics can be derived. Given it is an absolute scale and not an index, a unit of measurement such as MBtu/year is less vulnerable to being significantly altered and it will likely prove very durable over time.

Amount Per Serving	Cheerios	with 1/2 cup skim milk	Cereal for Children under 4
Calories	100	150	80
Calories from Fat	15	20	10
Total Fat 2g*			
Saturated Fat 0.5g			1.5g
Trans Fat 0g			0g
Polyunsaturated Fat 0.5g			0g
Monounsaturated Fat 0.5g			0.5g
% Daily Value**			
	3%	3%	
	3%	3%	
	0%	1%	100mg
	6%	11%	130mg
			15g

Consumer testing in Oregon by Energy Trust concluded that homeowners can understand the general meaning of the metric as much as any other, and appreciated the granularity it provides as long as appropriate comparative context is provided. Like with nutritional label information, consumers may not fully understand the specific meaning of technical terms or units of measurement. Yet if the results are properly contextualized, consumers can quite easily understand the relative merit or performance of the

home regardless of their understanding of what the unit of measurement actually represents. Certainly, annual net energy use (in MBtu/year) does not tell the whole story about home energy performance. Just as nutritional labels include not only calorie counts but also data on fats, sugars and

vitamins, we recommend that additional metrics be used alongside an annual net energy use figure. Twenty years ago, very few people discussed calorie counts in food items with their friends or family. Now we have a common understanding of what a calorie means to our health. Energy labeling policy, if applied with some consistency, has the opportunity to create a common vocabulary for home energy efficiency in our region.

While some program implementers might opt to utilize a more simplified metric on the energy label as a marketing tactic or for consumers with lower interest in energy performance, the primary metric that defines an official energy score is best applied as an MBtu/year metric. Less granular metrics can be presented to homeowners as part of the energy label design, but MBtu/year is a common metric that most currently used scoring systems and their modeling engines can and do produce. Including MBtu/year along with other metrics on an energy label is an acceptable approach (in fact, it may be the preferred approach) as long that MBtu/year metric is clearly identifiable as the sole energy score that is to be used for property comparison and property valuation purposes.

While all metrics have inevitable constraints, on balance the MBtu/year has the most beneficial attributes. For example, the MBtu/year metric does not portray larger sized homes in a more favorable light from an energy consumptions perspective. This is not the case for other metrics that are determined relative to square-footage (e.g., EUI, HERS ratings, etc.). In the cases where the “score” is generated on a per square foot basis, a home may have significant energy consumption in part because of the large size of the home, but this predicted overall consumption will not be represented in the score. Therefore, the larger home will appear to be high performing when in fact it has a much higher overall energy consumption footprint.

An absolute scale using MBtu/year is also preferable over an index or relative scale (such as “A through F” or “1 through 10”), as these types of scales can be vulnerable to pressure to adjust the underlying criteria for what a score of “C” or “5” means. Sometimes these pressures are scientific: “We have better knowledge of what plug loads actually are, so let’s change those.” Sometimes they are for marketability reasons: “An individual home’s score will improve more on our scale if we don’t reflect plug loads and lighting, and that’s more motivating.” Sometimes they are political: “We need to make large, new homes look better!” Or sometimes they are just because; “let’s invert the scoring index because that seems better.”

Regardless of what motivates these changes, the lasting result is inconsistent information. The real estate transaction markets works best with consistent

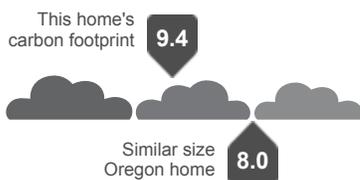
information so that professionals within that industry gain experience and confidence in using the information to guide their decisions or those of their clients. When an adjustment to an index or relative scale occurs, appraisers and other real estate professionals are less likely to trust the energy scoring data and may refuse to use it in calculating the relative value of higher energy performing homes. Residential appraisers need to feel confident that the energy performance metric associated with a certain house can be effectively evaluated against a similar number associated with a comparable home. Therefore, an energy labeling program that produces inconsistent data cannot be effective in impacting the real estate transaction market, one of the central rationales for developing a policy or program.

In some rare (we hope) cases, defining official energy scores in MBtu/year may be untenable because of local stakeholder considerations. In these cases, we recommend that policy makers use all of the following basic characteristics for defining an energy score:

- » An asset rating
- » Reported as a number that represents the total estimated annual net energy use of a home
- » For existing homes, based on physical inspection of the building
- » For new homes, based on as-built building design documents or physical inspection of the building.

E. CARBON CALCULATION DATA SOURCING

As noted above, including a carbon metric on home energy labels is a key means for increasing consumer awareness of energy performance. Energy labels that include carbon metrics also allow state and local governments to more accurately and closely tally and communicate progress toward carbon reduction goals.



To accurately calculate a carbon score in the Pacific Northwest, we recommend turning to state data. The states of Oregon and Washington require electric utilities to report to customers the “price, power source, and environmental impact” for each product the company offers. These requirements specifically direct utilities to report data on power supplied from the company’s generating resources. Utility specific numbers highlight the differences among utilities and would show the same house’s energy usage trends under the same conditions would have different carbon footprints between different utilities. Utility specific data for calculating the carbon impacts of a home’s energy use is therefore readily available in both Oregon and Washington.

Because this data is up-to-date and is able to account for market purchases, it

can be applied to both new and existing homes receiving an energy label with consistent methodologies applied to utilities in both Oregon and Washington. In Oregon, the Oregon Department of Energy (ODOE), in conjunction with Washington Department of Commerce and Washington State University Energy Program, follow protocols similar to those developed by the EPA in order to produce the eGRID data. However, these state agencies are better able to account for market purchases than is the EPA's eGRID data.

F. NORMATIVE AND ASPIRATIONAL COMPARISONS

As referenced in subsection C, Energy Label Format, energy labels should include comparative graphics and reference points so that users need not fully understand the technical definitions of the various energy units. At a glance, the user should be able to see if a home has been improved and how it compares to a “typical home”, however that may be defined. Additionally, policy makers may want to use energy labels as a communication tool to establish a “new normal” for energy performance by listing target levels of performance that are better than typical. This can recalibrate the expectations of each user and the community as a whole.



While at this time there is no consensus regarding the “best” approach for designing an energy label, one area of agreement is that the label should include clear, relatable, comparison points. Often, consumers are motivated by and interested in how their home performs relative to other similar homes within a relatively close proximity. Government policy makers can also design these reference points based on broader policies, such as state or local targets for energy reductions in existing homes. The idea of providing comparisons should extend beyond the label itself and also influence other programmatic marketing and sales tactics.

G. RENEWABLE ENERGY PRODUCTION

From an economic and policy perspective, most parts of the region continue to identify energy efficiency as an important prerequisite to investing in renewables. However, factoring in solar energy production in an energy score is necessary to provide the full measure of home performance. As solar PV and solar water heating continue to expand and come down in price, it is important for energy labeling programs to take renewable energy production into account. To do so will assist in regional clean energy policy goals of moving toward greater use of renewable energy, as well as creating a pathway towards the greater prevalence of net zero energy homes.

Houses that do produce renewable energy should at a minimum be recognized in energy labeling systems based on the reduction of net annual energy



consumption and utility costs. Systems such as the Home Energy Score (HES) do not currently calculate renewable energy production. In contrast, the Energy Trust's EPS does account for renewable energy production of a home by reducing the overall MBtu/year score by the amount of renewable energy generated at the home. Under Oregon's HB2801 rules, future EPS labels will include renewable energy production portrayed as a separate metric.

We recommend that renewable energy production be portrayed on an energy label as a separate metric that highlights the estimated total annual energy generated by on-site solar electric, wind electric, hydroelectric, and solar water heating systems. The units of generation should be portrayed in the type of fuel that has been displaced by that generation. Of course, the energy displaced through the home's renewable energy generation should also be captured in the overall energy score (MBtu/year) through the calculated reduction in estimated consumption.

II. Calculating a Score

A. CRITERIA FOR BUILDING ENERGY ASSESSMENT SOFTWARE

Energy labeling policy should establish performance criteria for home energy assessment software tools instead of selecting a single software vendor. By setting performance standards, policymakers can better ensure that the energy labeling system will be more flexible, while fostering innovation and competition among different home energy assessment software tool providers. Various home energy assessment software tools can be compared against this established criteria and, if found to qualify, become approved for use in that local market. This scenario also ensures that local energy raters, assessors, and home performance contractors can select the tool that best fits their needs, rather than being forced by program implementers to use a tool required by the program.



Including software qualification performance criteria that could be met by any eligible home energy assessment software tool will allow software providers to bring newly developed platforms into use in the regional market. Importantly this approach allows for innovation to occur and new software tools, as yet undeveloped, to be qualified for use at future dates. It also prevents the potential mistake of selecting a single software tool provider and becoming locked in to that provider's offerings.

This playbook offers a clear pathway for qualifying software that is based on an existing, tested system established by Energy Trust of Oregon but which has regional applicability. The existing pathway for qualifying software calculation engines established by Energy Trust is outlined below, with recommended modifications. We recommend that policy makers consider integrating Energy Trust's qualification criteria to ensure alignment across the region and to benefit from numerous years of testing and refinement already invested in this process. One particular benefit to this approach is that program implementers can establish a fee that must be paid by any software provider wanting to have their building assessment software evaluated for performance eligibility. This fee can be used to fund program activities on an ongoing basis.

Software qualification criteria for existing homes

To qualify as a home energy assessment software tool for generating energy labels for existing homes in the Pacific Northwest, a vendor of software should be required to provide:

- » Estimates of energy use for a test suite of a minimum of eighteen homes located within the state to assure model accuracy

- » A sample energy label generated from the software that contains the minimum set of metrics, as outlined in this policy playbook.

For example, Energy Trust’s test suite of 18 simulated Oregon homes was created to be representative of Oregon’s housing stock. The suite contains three different home models and two different heating fuels (gas and electric), providing six different sets of home characteristics. Those six home types are modeled in three different climate zones—Portland, Redmond, Medford—creating the test suite of 18 homes. A similar test can quite easily be performed in Washington and, at a later date, in other states in the region.

Each home type has been modeled in [SEEM](#) to provide a baseline estimate of energy usage⁴. SEEM is a program designed to model residential energy use and is used extensively in the Northwest to estimate conservation measure savings for regional energy utility policy planners. Program implementers would compare the software vendor’s submission documents against the SEEM estimates in order to qualify the software. The software must be able to provide estimates of total annual energy, and annual energy use by fuel type. The program implementer would then approve software that meets its criteria for accuracy. We recommend that program implementers revisit their criteria for software qualification every two years as this field is changing rapidly. It may be advisable to establish a technical advisory panel to assist in the updating of these criteria.

Program implementers may decide to approve a software calculation engine and apply weighting factors to that software’s energy estimates in order to approve it for use to generate energy labels within the program boundaries. In Oregon, Energy Trust has already established a methodology for applying these weighting factors to ensure consistency amongst multiple software calculation engines. If needed, a building energy assessment software provider could be instructed to apply these weighting factors in the calculations that generate an energy score.

In addition to evaluating the software calculation engine’s technical performance, an example energy label should be produced as a standard report from the qualifying software and provided to the program implementer for approval. In addition to the minimum set of metrics required on an energy label, program implementers should provide building energy assessment software providers with emission rates for electricity and natural gas by utility, as well as for fuel oil and for wood. Program implementers should also provide building energy assessment software providers with updated fuel prices for all utilities and assumed values for unregulated fuel prices. The building

⁴ <http://rtf.nwcouncil.org/measures/support/seem/>

energy assessment software providers should be required to incorporate these specifications into their building energy assessment software calculation engines to generate an energy label that meets the minimum data standards. An example label should be provided by the building energy assessment software provider and should be submitted to the program implementer for approval along with the modeling results for the minimum 18 test homes.

Software qualification criteria for new homes

For new homes, the most effective current pathway for generating energy labels is the use of REMRate™ software. REM/Rate has been thoroughly vetted by Energy Trust and Northwest Energy Efficiency Alliance (NEEA) for generating accurate estimates of energy use in new homes in the Pacific Northwest. Their research has compared REM/Rate™ energy use estimates to empirical data and modeled results from SEEM.

We also recommend that program implementers work closely with NEEA and the Regional Technical Forum (RTF) to follow the process of approval that REM/Rate™ is currently taking with RTF. This approval process could provide the basic methodology for program implementers to create a qualification standard for the building energy assessment software engines that will generate energy labels for new homes.

Once a program implementer has established a qualification standard, they may decide to calculate weighting factors for this software similar to the ones established for software approved under the existing homes system. This will help to ensure a consistent comparison in scoring homes between new homes and existing homes.

III. Professional Authorization and Accreditation

A. ACCREDITATION

Policy makers or program implementers should set accreditation standards for anyone producing an energy label. These accreditation standards should include requirements that the individual:

- a. Be certified as a home energy assessor by any relevant contractor's board.
- b. Have completed training in the building energy assessment software used to produce the label.

B. TRAINING FOR GENERATING SCORES

Policy makers or program implementers should set training guidelines for anyone authorized to produce an energy label. This training should include the successful completion of one of the following training and certification programs:

- a. Training and certification from the Building Performance Institute as a Building Analyst or Building Auditor.
- b. Training and certification from the Residential Energy Services Network as a Home Energy Auditor or Home Energy Rater.
- c. Training and certification from an authorized training institute as a Residential Energy Analyst.

C. QUALITY ASSURANCE FOR EVALUATING SCORES

We recommend a program implementer's role in quality assurance (QA) should include the following elements:

- a. Ensure that every qualifying home energy assessor is working under a contractual agreement with a QA provider that has been approved by the program implementer.
- b. Set standards for approval and oversight of those QA providers
- c. Provide a database of QA results from each QA provider.

Qualifying QA providers could include one or all of building assessment software providers, firms contracted to the software vendor, or a separate QA provider that has access to the results from the building energy assessment software engines for each energy assessor they provide QA services.

As much as possible, costs to provide these QA services should be born by the market, represented by fees paid by energy assessors to QA providers. The costs to program implementers should be those associated with receiving QA results from QA providers. This cost could be offset if QA



providers pay program implementers a fee to become approved.

Following is a recommended set of minimum standards for QA providers that program implementers should adopt to ensure energy labels are being delivered consistently. These standards would apply to both energy labels for Existing and New Homes.

- » The QA provider should review at least 1% of energy labels with a field visit and 10% desk review of energy label files.
- » QA provider should conduct quarterly data analysis of all energy labels their energy assessors have conducted and screen for likely data entry errors, then follow up with energy assessors for QA on those specific labels in which errors are found.
- » QA provider should administer 100% desk review on the first 5 energy labels of each newly qualifying energy assessor.
- » If the majority of the first 5 reviewed projects pass desk review (3 out of 5), then QA provider should review an additional 10% of energy labels annually.
- » If the majority (3 out of 5) of these reviewed energy labels fail desk review, then the QA provider should administer desk review on the succeeding 5 energy labels.
- » If the majority of the 2nd set of 5 energy labels fail desk review the QA provider should require the energy assessor to be retrained by the software vendor they utilize. After retraining, the QA process should reinitialize.
- » When an energy label fails QA review, the energy assessor must correct the error/s and reissue the energy label to the customer.
- » The program implementer should establish the criteria for what constitutes an error found during desk review or field inspection.

IV. Information Storage and Access

A primary goal of energy labeling programs is that the energy information contained on a label be used in real estate transactions. These transactions often occur at a date considerably later than when the energy scores themselves were produced. Therefore, an accessible database solution must be integrated into energy labeling policy and program design. Particular consideration must be given to integrating or connecting the energy scoring database with local MLS databases.

Program elements such as data storage and data transfer—while perhaps longer-term concerns—should be considered during initial program design, as they have significant technical and resource needs. Existing voluntary programs that are generating thousands of home energy labels, sometimes from different systems, are beginning to think about how to track these labels in a centralized database. Most importantly, there needs to be a mechanism for making the scores easily available to the real estate transaction market. Scores that are merely captured in a database with no functional way for them to be used by Realtors, appraisers, lenders, and homebuyers are of greatly reduced value.



While the technical functionality of a database system and the data transfer between software systems can certainly be complicated, the real challenge lies in ensuring that the energy score can be made public. For instance, under HB2801 the Oregon Department of Energy (ODOE) has the authority to house energy scores generated in the state, however the law requires that ODOE hide the addresses of the homes that have received a score. This greatly limits the usefulness of the scores, as the real estate transaction market cannot use the data captured in the database for home comparison or valuation purposes.

Many policy makers will face a similar situation. One potential solution is to form an agreement with the local energy utility programs and link customer incentives to an opt-in public disclosure of the score. These scores can then automatically be transferred to the relevant database or to third party databases housed by local MLS providers or local property tax assessment agencies.

When

IS AN ENERGY LABEL MADE?



When a new home is built



When a home is put on the market



When a home gets an energy efficient retrofit

V. Recording Energy Scores for Real Estate Transactions

Part of the vision for residential energy labeling efforts relates to the important linkage with valuation in real estate transactions. This currently necessitates connecting with local MLS systems in order for home data to be available that might influence appraisal and lending communities.

Clearly, residential energy scores are being produced with greater frequency for both new and existing homes as part of energy labels. To date, these energy labels are being voluntarily generated and disclosed to potential homebuyers or renters. While legislation to mandate energy labels at certain key decision points (e.g. at time of home sale, when major remodeling occurs, etc.) will not be enacted in the near term, there are two potential interconnected mechanisms for energy scores to become more accepted and used by real estate professionals, appraisers, and ultimately consumers.

A. ENERGY SCORES IN MLS DATABASES

MLS databases are usually subscriber owned databases (Realtor Trade Associations) with generally localized geographic focus. MLS databases are set up for real estate professionals who are using the information to screen information for clients. The way the material is organized in the database is vetted by a committee of real estate professionals, who are the subscribers and owners of the information contained in the database. The database is one of the key ways to accomplish their main task of selling homes by providing important details to other professionals and, through them, to potential homebuyers.

A 'forms committee' made up of the MLS membership usually handles additions or changes that are requested of the local MLS - including the inclusion of fields for energy scores. Therefore, subscribers control the amendment process and no single decision maker can unilaterally make a change. The subscribers also pay for the maintenance/programming changes to the database and typically work a year in advance for recommended changes. Most regional MLS databases partake in a vetting process of any requested change or addition to the database. If approved, the new or amended field is included into a work list of database changes.

In Oregon, the RMLS covers a significant but not comprehensive portion of Oregon. The RMLS currently includes fields that show the type of energy score and the date of the score. If the field is populated, there is a requirement to upload a copy of the energy label document so the details can be verified. It is important that enough useful information be provided for the score to have value to a buyer. There are several other independent MLS database systems

throughout Oregon in which an energy score field is not currently included.

A similar situation is evident in Washington. The greater Puget Sound region's Northwest MLS has included green fields, including those for various energy scores, for several years. Through efforts by the Northwest Energy Efficiency Alliance (NEEA), the addition of energy score fields in other MLS systems has recently been completed. Bellingham, WA is one such example, having made amendments to their local MLS at the end of 2013.

For both local MLS systems that have already added fields for green and energy efficiency components and for those considering these additions, we recommend that MLS staff and others use the [Green MLS Tool Kit](#) when implementing green fields. This guide addresses a subset of fields contained within the RETS Data Dictionary that relate specifically to high-performance homes. The focus is on the technical implementation of new fields for MLS staff and vendors and is mapped directly to the RETS Data Dictionary. It defines details down to the enumeration or field-value level based on consensus input from industry stakeholders.



B. ENERGY SCORES ON PROPERTY TAX RECORDS

One viable pathway being explored in several jurisdictions is to make energy scores more visible to the real estate market by including them as part of official government property records, such as on property tax records.⁵

Property tax assessors are uniquely well suited to obtain and record energy rating information. They not only have the legal duty to obtain and record attributes of buildings that are relevant to market value, such as the energy efficiency, but they already routinely obtain and record similar information from a number of reliable sources. Unlike other repositories of building information, assessors are unique in having legal authority to require owners to provide information relevant to their building's market value. In turn, assessors are obligated to allow public access to the information they collect, except for rare exceptions when they keep information confidential.

To become an effective process and means for recording energy ratings in official property records, existing property tax assessment records must be enhanced to allow for the inclusion of energy ratings. Entering energy ratings into property tax records has the benefit of facilitating their subsequent automated inclusion in multiple listing service (MLS) listings. MLS systems pull data directly from local property tax records. In addition, MLS systems pull the same data indirectly by purchasing data from national

⁵ Earth Advantage conducted research in Kitsap County, WA. Results of this research can be found at <http://www.earthadvantage.org/assets/documents/EnergyRatingsOnPropertyTaxRecords-%20FINAL-140203.pdf>

data providers, which obtain information directly from local property tax records and other sources. Thus, either directly or indirectly, MLS systems obtain information from local property tax records. Including energy ratings in property tax records makes it simple for the numerous MLS systems to capture this data, thereby potentially informing not only prospective purchasers and renters about a particular home's energy consumption, but also providing brokers and appraisers with this additional information relevant to the appropriate pricing and valuation of real property.

Advocates of the inclusion of energy ratings on property tax records will need to work closely with county assessors, providing data that supports the addition of a field for energy scores based on the growing dissemination and use of scores. Proponents of energy score inclusion may presume that they may have to overcome institutional inertia of the status quo: keeping the assessment database the same. Anticipating that, proponents should consider the barriers to inclusion and how to overcome them. There are several potential barriers to approving and implementing the inclusion of energy scores on property tax records that will need to be addressed to varying degrees depending on local circumstances. These include the following:

Barrier: *Skepticism that energy performance of a home sufficiently affects value.*

Response: Energy efficiency directly affects operating costs of a home. For example, certain measures to improve efficiency (e.g., enhanced thermal performance and mechanical/lighting equipment) reduce consumption and energy costs. That "operating energy" cost affects the value of both owner-occupied homes and rental residential property.

Barrier: *Perceived increase in costs and/or workload.*

Response: The assessor could fairly easily adapt its computer program to add a field for energy scores. Assessors can make this decision themselves without authorization or review by others. There is no required legal process, procedural impediments, or review. However, most appraisal software is subject to a vendor's license and payment is sometimes necessary to make the changes. Presumably, any changes to a database to allow the recording of energy ratings, could be done at the same time as other planned alterations.

Barrier: *Perceived increase in overhead costs. An important consideration for any assessor would be a possible increase in overhead required to manage public interest or confusion regarding the new data field. Assessment office personnel could presumably receive an increased volume of inquiries related to the energy score disclosure requirement. Managing this could require an increase in staff time (and staffing costs). It is likely that a spike in inquiries would be relatively short-lived and would decrease as the public becomes more*

familiar with both the concept of energy scores and with its inclusion on property tax records. However, it is this perceived increase in workload and cost for assessors that could limit interest in making the property tax record changes.

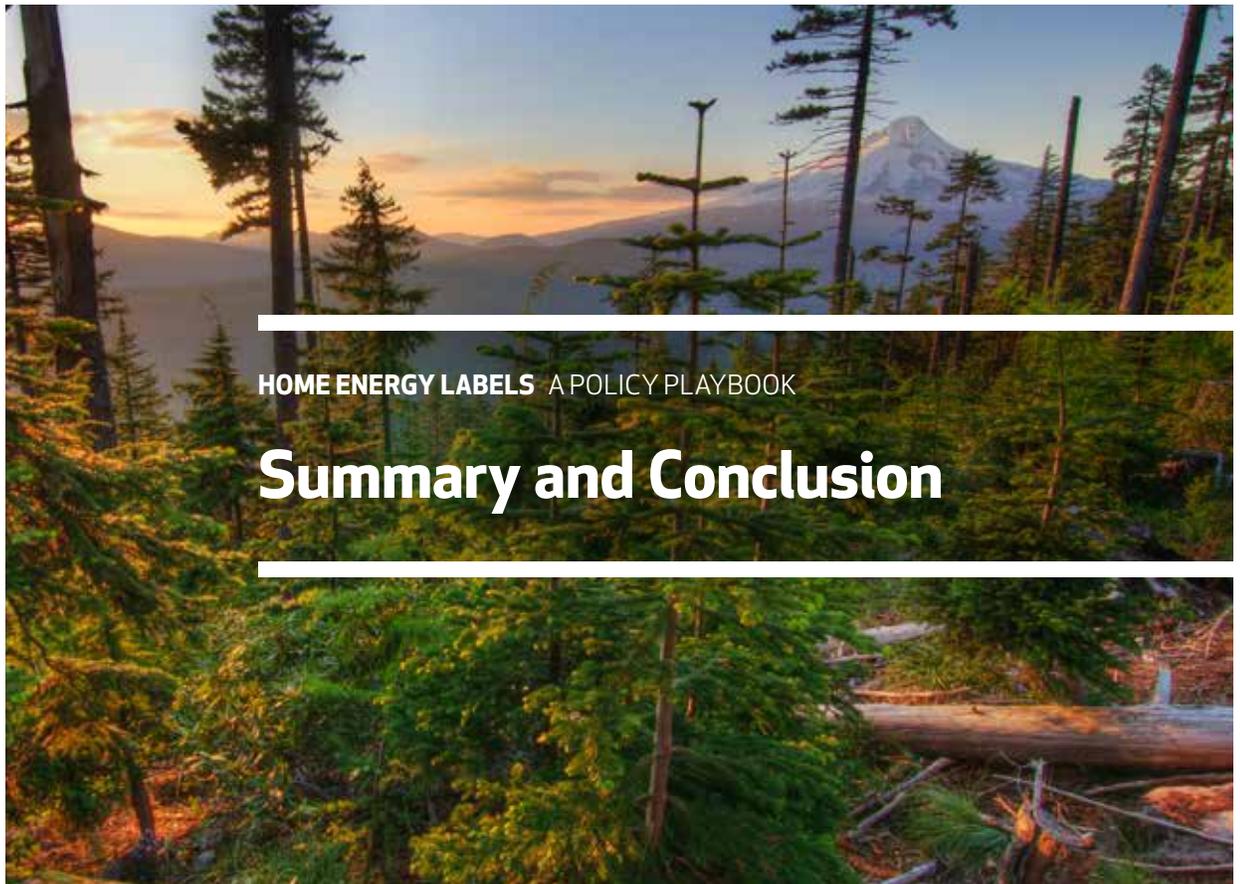
Response: This perceived barrier could be overcome if program implementers worked with assessor staff to identify a point-of-contact outside of the assessment office with knowledge of both residential energy scoring and the changes to the assessment records to facilitate public understanding and acceptance without imposing additional burdens/costs on the assessor's staff.

Barrier: *Difficulty for assessor to differentiate energy scoring systems.*

Response: In areas where policy has not been enacted to provide consistent definition of an "official" energy score, assessors may find it challenging if different scoring systems are available in the market and being used by real estate professional, energy assessors, contractors, or builders. This issue reaffirms the need for a consistent energy labeling policy - such as what is offered in this policy playbook - to be enacted as broadly as possible.

Barrier: *Resistance from owners of energy-efficient homes fearing energy ratings in assessment databases could increase their property taxes.*

Response: If property tax assessors are interested in including energy scores as part of their permanent databases of home information, a possible initial action that may be required is to ensure that the receipt of an energy score by the assessor does not trigger a property tax reassessment. Precedent exists in which solar advocates have successfully proposed and championed state laws exempting renewable energy systems from property taxation in many states. A similar policy action is desirable for energy scores.



HOME ENERGY LABELS A POLICY PLAYBOOK

Summary and Conclusion

Recent research suggests that consumers are beginning to see an energy label as more than merely a symbol of quality. Consumers are more likely to view the information conveyed by an energy score as an important tool in helping them make smarter purchasing decisions. Recent surveys have shown a majority of respondents thought an energy score that explained a home's current energy use would be useful to them in selling or buying a home⁶.

Many in the real estate industry are noticing this shift amongst consumers as well. The average homebuyer's mentality has changed in the last few years. During the housing boom of the mid-2000's, buyers in general only considered the sales price because the transaction was often seen as merely a short-term, perhaps speculative, investment. As buyers begin to think about the purchase with a long-term perspective, factors like energy become more important.

⁶ Cadmus, 2014. Multi-State Residential Retrofit Project: Process Evaluation Final

Builders and sellers of homes often encounter homebuyers who just don't know how to ask questions about a home's energy performance or if they do, don't know whether they're getting the right answer. An energy labeling policy helps close the loop by providing the consumer with the information they need to ask the right questions and the product validation they need to know they're getting the right answers. Consumers will benefit from an energy labeling program that creates more transparency in the market. By the same token, the home building industry is beginning to see the advantages of a regionally consistent energy rating system that can easily address consumer confusion and emphasize the inherent benefits of their products.

Home energy labels simplify the complications inherent in trying to communicate complex building science subjects with the general public. There is considerable agreement that the public needs simple, yet compelling information in order to understand why they should care about the energy performance of their home and how to make the best choices.

Energy labels can be confusing to the average person if not done right. An energy score can only be as meaningful as the methodology that derives it. It advantages not only the clean energy industry, but all real estate-focused industries to support consistent energy labeling "rules of the road" that are accurate, reliable, flexible and comprehensible for consumers and professionals alike.

Appendix A: Useful Definitions

Asset rating means a representation of the building's energy efficiency or energy use generated by modeling under standardized weather and occupancy conditions.

Building means any enclosed structure created for permanent use as a residence, a place of business, or any other activities whether commercial or noncommercial in character.

Energy assessment means a determination of a building's energy use and efficiency in order to determine the building's energy performance.

Home means a residential building of four or fewer dwelling units.

Operational rating means a representation of the building's energy use generated by measuring actual energy consumption taking into consideration all physical systems and their operation.

Physical systems means any energy consuming or generating equipment integrated in the building design, function or operation.

Energy scoring systems means the generic term for any technical and administrative framework for producing and displaying a metric for scoring the energy consumption of a building.

Energy Trust of Oregon EPS means an energy scoring system created and administered by Energy Trust of Oregon.

U.S. Department of Energy Home Energy Score means an energy scoring system created and administered by the U.S. Department of Energy.

HERS means an energy scoring system created and administered by the Residential Energy Services Network (RESNET).

Energy Score means one specific, primary energy performance metric. (Sometimes also referred to as an Energy Rating)

Energy Label means a usually one-page document that portrays information and key metrics related to the energy consumption of a home, and includes the Energy Score.

Energy Report means a document that may accompany the Energy Label that provides more detail about the home, including specific recommendations for energy improvements.

Home energy assessment software means a tool that analyzes the energy use of a home and which is used in generating a score, amongst other metrics.

Home energy assessment software provider means an entity that provides a tool that analyzes the energy use of a home and which is used in generating a score, amongst other metrics.

Appendix B: Summary Research

This document summarizes a set of relevant studies⁷ on residential energy modeling tools and/or the development of energy rating systems for homes. It should be noted that the energy modeling software tools evaluated in these studies have released newer versions over time. The modeling results discussed in each of these studies should be understood as specific to a tool's performance at the time of that particular study.

The following documents are organized chronologically, with the most recent studies listed first:

"Residential Energy Use Disclosure: A Guide For Policymakers,"

11 pages, ACEEE: Policy Toolkit, June 2014.

ACEEE provides an overview of existing national residential disclosure efforts, including some energy scoring projects. This document offers a primer on tailoring strategies to meet local policy objectives, including why energy ratings should be considered and an introduction into what approaches have been used to date.

"Efficiency Vermont Homeowner Survey Report", 38 pages, The Center for Research and Public Policy for Efficiency Vermont, Summer 2013.

The Vermont Comprehensive Energy Plan has called for the adoption of an energy labeling system at the state level. The Vermont legislature created a task force to examine the issue and make recommendations. This survey report contains the raw data collected in focus groups conducted on comparing potential score card formats.

"Efficiency Vermont Tool Testing Results Summary: using HEST 2012 version", 38 pages, Efficiency Vermont, October 2013.

The Vermont Comprehensive Energy Plan has called for the adoption of an energy labeling system at the state level. The Vermont legislature created a task force to examine the issue and make recommendations. This spreadsheet compares 2012 modeling results for 26 older Vermont homes. Rem/Rate, HEST, and CakeSystems (referred to as EPS) were compared. There is a mix of gas and oil heated homes. Some of the homes also burned wood, which HEST was unable to account for.

⁷ Please note that Earth Advantage co-authored one of the referenced papers, supplied data to several others, and allowed access to its modeling software, CakeSystems, for a number of the referenced studies.

⁸ http://publicservice.vermont.gov/sites/psd/files/Topics/Energy_Efficiency/BEDWG/EnergyScore_Round1_SurveyReport.pdf

“Efficiency Vermont Tool Testing Results Summary: using HEST 2013 version”,
38 pages, *Efficiency Vermont*, October 2013.

The modeling results in this spreadsheet are identical to the previous version except that a newer version of HEST was used. The results for HEST improved as a bias for over-predicting heating use decreased.

“Field Assessment of Energy Audit Tools for Retrofit Programs”,
57 pages, *J. Edwards et al for Building America*, July 2013.

The authors compared modeled energy use against actual utility bills for 154 Minnesota homes. Results from Rem/Rate, HEST and the SIMPLE spreadsheet were compared and the amount of time needed to collect data and use each tool was reviewed as well. All tools were shown to over predict energy use, with SIMPLE providing the closest estimates with an average of 18%, compared to 55% for HEST and 63% for Rem/Rate. SIMPLE also required the least time to use, 1 hour. That compares to 1.5-2 hours for HEST and 4-6 hours for Rem/Rate.

“Memorandum: Energy Performance Score Benchmark”,
16 pages, *Energy Trust*, Spring 2012.

Senate Bill 79 provides examples of benchmarks that may be displayed on an Energy Performance Score. This paper provides the technical background of how Energy Trust calculates different benchmarks. Recent energy use data across climate zones and heating fuels is utilized to create formulas that create benchmarks specific to each home receiving a score.

“Assessment of the US Department of Energy’s Home Energy Scoring Tool”,
90 pages, *D. Roberts et al for US DOE*, July 2012

The National Renewable Energy Laboratory (NREL) conducted a series of assessments for the U.S. Department of Energy on its proposed Home Energy Scoring Tool (HEST). The primary objective of this work was to assess the accuracy of HEST as it was being developed and to provide information useful to DOE program managers and HEST development team at Lawrence Berkeley National Laboratory. NREL assessed the accuracy of HEST from the version used for the Home Energy Score pilot, released January 26, 2011, through the April 27, 2012 release. Predictions of energy use were compared with utility billing data for a mixture of 859 newer and older homes located in Oregon, Wisconsin, Minnesota, North Carolina, and Texas. Similar comparisons were made between predictions from two other commonly used residential energy analysis software tools, REM/Rate and SIMPLE. All three tools showed similar results.

9 <http://www.nrel.gov/docs/fy12osti/54074.pdf>

“Energy Performance Score (EPS): A Path Forward”,

*11 pages, Energy Trust, May 2012*¹⁰.

This paper was written as a follow up to the January 23rd, 2012 stakeholder meeting and it summarizes the recommended next steps in the development of an EPS for existing homes, including a modification to the EPS metric itself in order to normalize for fuel source. Energy Trust suggests utilizing “Adjusted BTUs” as a method for handling the issue of fuel neutrality in scoring homes. The suggested method would weight electricity used for heating and water heating at rates of relative efficiency between heat pump and gas equipment. After publication of this paper example homes were analyzed and Energy Trust adopted the method.

“Energy Performance Score Workshop – Existing Homes”,

*54 slides, Energy Trust, January 2012*¹¹.

This presentation was delivered at a January 23rd, 2012 stakeholder meeting where Energy Trust explained its work to date on developing a method for scoring existing homes. The 2011 Energy Trust pilot work on energy scoring, including a survey of 149 households, is discussed and recommendations for next steps are made. The fact that site energy based scores favor heat pump homes and source energy based scores favor gas heated homes is shared. Assuming some standard appliance loads for these modeling purposes is suggested.

“Home Energy Performance Scores: Efforts to Date with Modeling Tool Comparison and Summary of Key Issues”,

*82 pages, MetaResource Group for Energy Trust, January 2012*¹².

The author provides a brief history of home energy scores and summarizes the key issues of adopting a scoring methodology. The report reviews three studies and lists them as appendices. Appendix B, Energy Performance Score Modeling Comparison, provides a detailed statistical comparison of multiple energy modeling tools including: CakeSystems (listed as Earth Advantage), Energy Measure Home (EMH), HEST, Recurve. CakeSystems and EMH were the highest ranked tools.

“How to Show Carbon on the EPS: A Decision Primer”,

*6 pages, Energy Trust, March 2011*¹².

This short paper describes the rationale for Energy Trust to use utility specific emission factors when calculating the carbon footprint of a building and displaying that on an Energy Performance Score. This method differs from the Senate Bill 79 rules and the two methods are compared.

¹⁰ http://energytrust.org/library/meetings/other/EPS_HES_Proposal_CAC.pdf

¹¹ <http://energytrust.org/About/PDF/Jan23EPSReport.pdf>

¹² http://www.oregon.gov/energy/docs/Stakeholder%20Supplied%20Materials/EPS%20and%20Carbon%20final%20draft_CAC_110413.pdf

“Energy Performance Score 2008 Pilot Findings and Recommendations Report”,

91 pages, Earth Advantage and Conservation Services

Group for Energy Trust, August 2009.

The goals of the 2008 EPS pilot were to examine potential software tools and analyze potential appropriate scoring metrics. The initial concepts were borrowed from the UK’s Energy Performance Certificate. Surveys of homeowners and Realtors were conducted to assess information requirements for a score. Over 100 software tools were reviewed and three were tested; Rem/Rate, SIMPLE, and Home Energy Saver. Home Energy Saver was later adapted to create the HEST. Estimated energy use was compared to utility bill data from an age representative sample of 190 Oregon homes. Each home was audited and data was collected specifically to match the input requirements of each tool. SIMPLE earned the strongest recommendation from the research team for use in scoring due to its time efficiency and relative accuracy compared to the other tools.

Appendix C: Sample Energy Labels

- 45 Energy Trust of Oregon, New Home
- 46 Energy Trust of Oregon, Existing Home
- 47 Alabama Wise
- 48 Seattle City Light
- 49 Mass Save
- 50 Efficiency Vermont



EnergyPerformanceScore
brought to you by Energy Trust of Oregon

EPS is a tool to assess a home's energy consumption, cost and carbon footprint.

EPS™ is an energy performance score that measures and rates the energy consumption and carbon footprint of a newly constructed home. The lower the score, the better—a low EPS identifies a home as energy efficient with a smaller carbon footprint and lower energy costs.

Location
1935 Home Street
Portland, OR 97201

YEAR BUILT: 2013
SQ. FOOTAGE: 1,800
EPS ISSUE DATE: 09-25-13

Utilities:
Gas: NW Natural
Electric: Portland General Electric

Estimated Monthly Energy Costs

\$69*

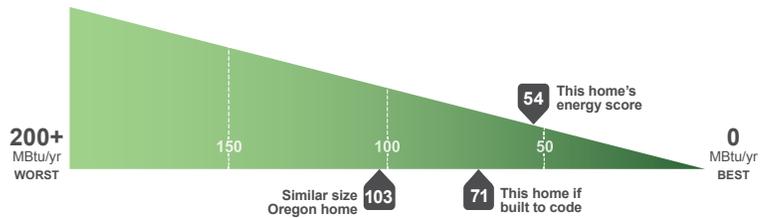
Estimated average annual energy costs: \$825*

Estimated average energy costs per month: Electric \$37, Natural gas \$32

ENERGY CONSUMPTION: Measured in millions of Btu per year (MBtu/yr). One million Btu = 293 kWh or 10 therms.

Energy Score

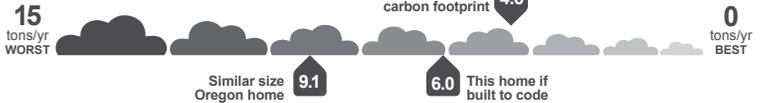
54



Estimated average energy usage: Electric (kWh): 4,407*, Natural gas (therms): 389

CARBON FOOTPRINT:

Measured in tons of carbon dioxide per year (tons/yr). One ton ≈ 2,000 miles driven by one car (typical 21 mpg car).



Estimated average carbon footprint: Electric (tons/yr): 2.3, Natural gas (tons/yr): 2.3

*Actual energy costs are based on many factors such as occupant behavior and weather. A home's EPS takes into account the energy-efficient features installed in the home, but does not account for occupant behavior.

PRELIMINARY





Energy Performance Score
brought to you by Energy Trust of Oregon

EPS is a tool to assess a home's energy consumption, cost and carbon footprint.

EPS™ is an energy performance score that measures and rates the energy consumption and carbon footprint of an existing home. The lower the score, the better—a low EPS identifies a home as energy efficient with a smaller carbon footprint and lower energy costs.

Location:
1975 House
Portland, OR 97214

YEAR BUILT: 1975
SQ. FOOTAGE: 1,800
EPS ISSUE DATE: 09-18-2013

Utilities:
Gas: NW Natural
Electric: Portland General Electric

Estimated Monthly Energy Costs

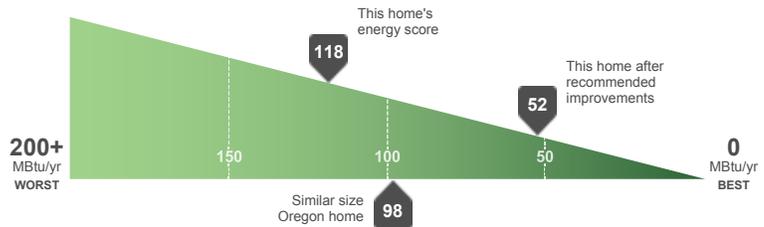
\$164*

Estimated average annual energy costs: \$1,971*

Estimated average energy costs per month: Electric \$41, Natural gas \$123

ENERGY CONSUMPTION: Measured in millions of Btu per year (MBtu/yr). One million Btu = 293 kWh or 10 therms.

Energy Score
118



Estimated average energy usage: Electric (kWh): 6,993*, Natural gas (therms): 1,140

CARBON FOOTPRINT:

Measured in tons of carbon dioxide per year (tons/yr). One ton = 2,000 miles driven by one car (typical 21 mpg car).

15 tons/yr worst



*Actual energy costs may vary and are based on many factors such as occupant behavior, weather and utility rates. A home's EPS takes into account the energy-efficient features installed in the home on the date the EPS was issued, but does not account for occupant behavior.

UNOFFICIAL





Home Performance Score is a tool to assess a home's energy consumption, cost and carbon footprint.

This report has been prepared for:
Lauten Johnxxx
 Location:
220 Main St
Birmingham, AL 35216

Audit Date: **January 6, 2014**
 Sq. Footage: **3300**
 # of Bedrooms: **5**
 Year Built: **1949**
 Fuel Type(s): **Electric, Gas**

Home Performance Score is a tool to assess the energy consumption of a home. The lower the score, the better—a low HPS identifies a home as energy efficient with lower energy costs.

Estimated Monthly Energy Costs

\$157*

5-year savings potential:

\$2,773*



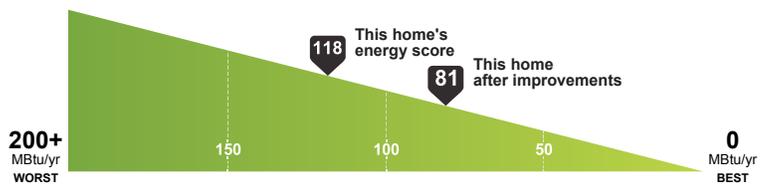
Estimated average energy costs per month: Electric \$116, Natural gas \$41

Energy Score

118

ENERGY CONSUMPTION:

Measured in millions of Btu per year (MBtu/yr).
 One million Btu = 293 kWh or 10 therms.



Estimated average energy usage: Electric (kWh): 16,346*, Natural gas (therms): 617

*Includes solar energy

*Actual energy costs may vary and are based on many factors such as occupant behavior, weather and utility rates.

Prepared By:
Jonathan Handey
 555-555-5555
 xxx@xxx.zzz

Eco-Three
 1500 1st Ave N
 Birmingham, AL 35203



Brought to you by **AlabamaWISE**
 alabamawise.org | nexusergycenter.org



Alabama WISE Home Performance Score

ENERGY PERFORMANCE SCORE

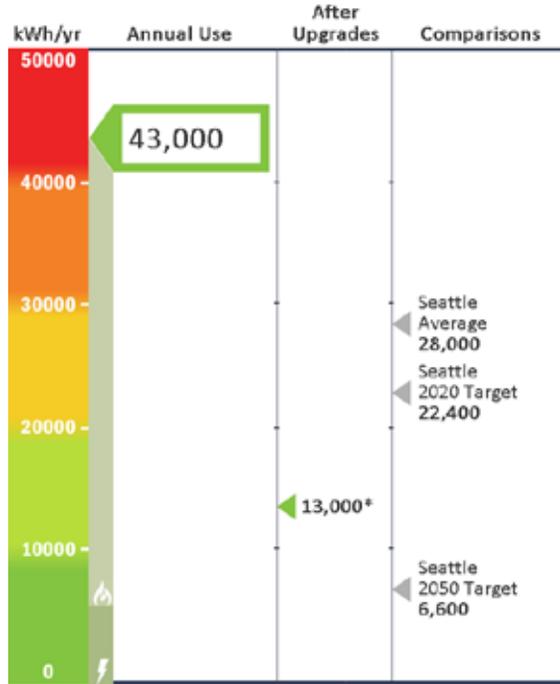
Address: 730 Main St
Seattle, WA 98117

Reference Number: 530016992

● Energy Use: 43,000 kWh/yr \$2,068
⚡ Electric: 6,200 kWh/yr \$437
🔥 Natural Gas: 1,300 therms/yr \$1,631

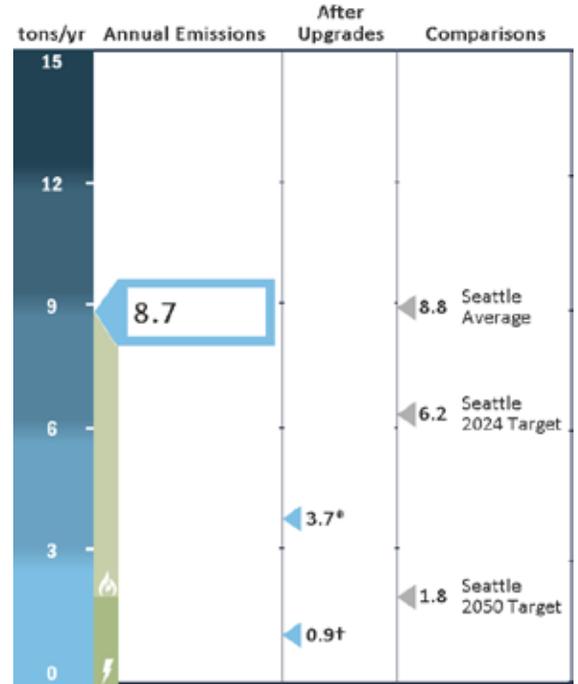
● Carbon Emissions: 8.7 tons/yr
⚡ Electric: 2.1 tons/yr
🔥 Natural Gas: 6.6 tons/yr

Energy Use



*See Recommended Upgrades

Carbon Emissions



*See Recommended Upgrades
†With energy from renewable sources

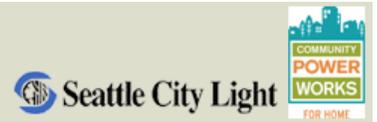
The energy score measures the estimated total energy use (electricity, natural gas, propane, heating oil) of this home for one year. The lower the score, the less energy required for normal use. Actual consumption and costs may vary. Measured in kilowatt hours per year (kWh/yr).

The carbon score measures the total carbon emissions based on the annual amounts, types, and sources of fuels used in this home. The lower the score, the less carbon is released into the atmosphere to power this home. Measured in metric tons per year (tons/yr).

5+ Bedroom, 2,020 sq ft Single Family Detached Home, built in 1919

Assessment Date: 05/02/2014 Energy Professional: Washington Home And Energy
Sperline, Eric

SIMPLE Energy Algorithm v 0.9.12.4





YOUR HOME'S ENERGY PERFORMANCE SCORE

Home MPG, a program within Mass Save®, provides you with your home's "miles per gallon" energy performance rating, called an "energy performance score" or EPS. By helping you better understand your home's energy use, Home MPG helps you make smart decisions about implementing improvements that make your home more energy efficient and reduce your energy costs.

Your Home's ENERGY PERFORMANCE SCORE

This score shows the estimated total energy use (electricity and heating fuel) of your home for one year. *The lower the score, the better!*



Estimated percentage of energy use by fuel type: Electric <XXX%>, Natural Gas: <XXX%>

160

PREPARED FOR

<Customer Name>
<Customer Address>
<City>, <State> <Zip>
Ref #: <Site ID>

Year Built: <XXXX>
Sq Footage: <XXXX>
Bedrooms: <X>
Primary Heating Fuel: <XXXX>

EPS Report Date: <XX/XX/XXXX>
Energy Specialist: <Energy Specialist Name>

DOLLARS & SENSE

Current Estimated Energy Costs **\$2000** Per Year

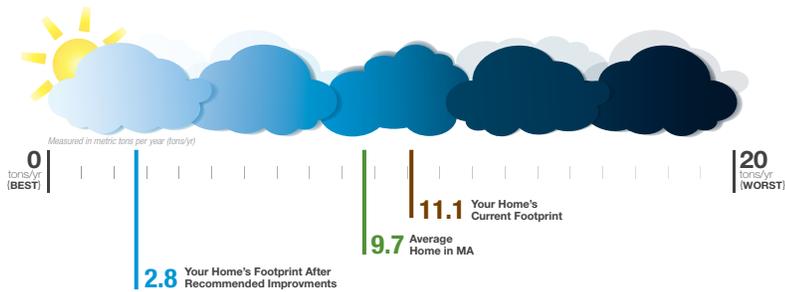


ESTIMATED ENERGY SAVINGS **\$1150** Per Year

Based on implementing all of the recommended energy efficiency improvements

Your Home's CARBON FOOTPRINT

This score shows the estimated carbon emissions based on the annual amounts, types, and sources of fuels used in your home. The lower the score, the less carbon is released into the atmosphere to power your home.



Estimated average carbon footprint (tons/yr): Electric <XX>, Natural Gas <XX>

11.1



For more information on Home MPG or to create an online account to manage your home's information, visit masssave.energy-performance-score.com.

Actual energy costs may vary and are based on many factors such as occupant behavior, weather and utility rates. Please see reverse for more on the EPS calculation. Projections for ratings and energy savings are estimates based on implementing all of the recommended energy efficiency improvements.

Mass Save Home MPG



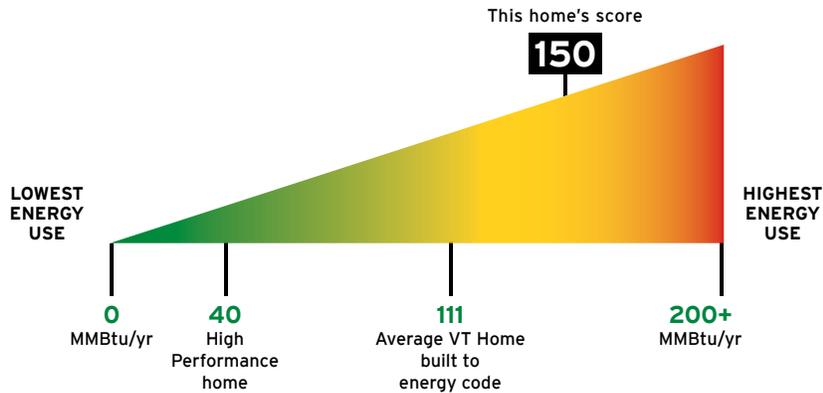
The Vermont Home Energy Score (VHES) ranks a home's energy consumption based on typical occupancy and weather.

The lower, the better! A low VHES identifies a home in Vermont as energy-efficient, with lower energy costs and energy usage.

150

THIS HOME'S SCORE

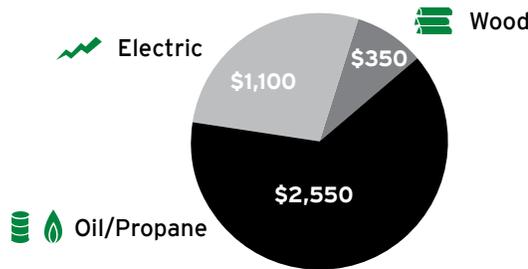
The VHES* shows the estimated total annual building energy use (electricity and fuel in MMBtu) of this home for one year. **The lower, the better!**



\$4,000

ESTIMATED ANNUAL ENERGY COST*

Based on fuels currently in use in this home.



HOME INFORMATION

Location:

123 Main Street
Anytown, VT 05000

Year built: 2002

Size of home (sq. ft.): 1,723

Heating fuels used in this home: oil, wood

Other energy features:
solar hot water

Score issue date: 6/23/13

Assessor:

Name: John Doe

Phone: 802-555-1111

The U.S. Department of Energy (DOE) Home Energy Score uses a 10-point scale to describe your home's efficiency—where 10 is most efficient.

For more information about this home's national score, visit <http://homeenergyscore.gov/5256788>.



*Energy use and costs are estimates only. Actual usage and costs may vary and are based on many factors such as weather and occupant behavior, including use of wood stoves. The Vermont Home Energy Score takes into account the energy-efficient features installed in the home on the date the Score was issued, assuming average occupant behavior. Actual energy use will vary depending on how the building is operated, and costs will vary as fuel prices change over time. MMBtu = 1,000,000 British thermal units (Btu) of energy.