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Establishing a California Home Energy Labeling Program that Accelerates Equitable Housing Decarbonization Across the State

Additional submitted attachment is included below.

earthadvantage

FEBRUARY 23, 2024
RE: WHOLE-HOUSE HOME ENERGY RATING AND LABELING PRE-RULEMAKING
DOCKET NO. 23-HERS-02

California Energy Commission Docket Unit
Docket No. 23-HERS-02
715 P Street
Sacramento, CA 95814

SUBJECT: ESTABLISHING A CALIFORNIA HOME ENERGY LABELING PROGRAM THAT ACCELERATES EQUITABLE HOUSING DECARBONIZATION ACROSS THE STATE

Dear Cheng Moua, CEC Commissioners, and staff,

Earth Advantage thanks the California Energy Commission for their interest in the important topic of home energy labeling in California. Earth Advantage is a national nonprofit based on Portland, Oregon with extensive expertise on the costs, benefits, risks, and rewards associated with home energy labeling programs, and is eager to support California with this expertise in this RFI response.

Earth Advantage's staff bring a combined 70+ years of experience designing, implementing, and evaluating impacts of home energy labeling policies and programs. Earth Advantage is a recognized leader on this topic both within California – as an implementer in the Bay Area Regional Energy Network (BayREN) Home Energy Score Rebate Program – and nationally. Earth Advantage has supported dozens of cities, states, financiers, and underwriters around the country to explore home energy label programs and policies, and has been recognized by the U.S. Department of Energy (US DOE)'s Home Energy Score program for national leadership, innovation, and home energy labeling results.

Home energy labels that can be used in real estate listings, home appraisal, financing determinations, and public policy have the power to transform the market at scale. A successful home energy label will provide useful and easy to understand information to key housing decisionmakers in moments when they are able to take action to invest in home energy upgrades that improve home comfort, reduce energy bills, improve indoor and outdoor air quality, and support climate and housing goals. Home energy labels should be designed to meet the needs of various housing decisionmakers – homeowners, buyers, sellers, renters, home appraisers, mortgage lenders, and housing/infrastructure regulators – such that these people can feel confident investing in home efficiency and electrification features.

Earth Advantage also believes that this work will only be successful at the necessary scale to impact the climate crisis if national standards and systems are adopted. Nationally applicable standards and systems will make it easier for national financing, underwriting, regulating, and policymaking entities to aggregate data and make changes to their "business-as-usual" practices that carry national ripple effects. As the state with the largest population, the greatest number of homes, and highest GDP, California can create pull for these national players to participate in green home funding and financing in California as well as the rest of the country. California is uniquely poised to update its whole-house home energy labeling program to drive energy upgrades in California's 14 million homes, as well as the 126 million homes in the US outside of California.

If successful, green home lending in the US could begin to look more like Europe, where Energy Performance Certificates (EPCs) are supporting financial markets as the European Banking Authority has begun requiring lenders to report their Green Asset Ratio (GAR) starting in 2024. For GAR reporting, EPCs enable real estate to be "taxonomy eligible assets," meaning they can be measured as an element in this ratio and monitored. The DOE's Home Energy Score was designed to meet needs for documenting home energy status in the United States and improves upon label elements gathered from researching impacts of EPCs in Europe. By adopting a home energy labeling scheme in California that builds off existing systems that can drive national markets while also meeting state-specific needs, CEC can drive outsized impact with this rulemaking. More information about how home energy labels can unlock financing is available in this report Earth Advantage co-authored with RMI: https://rmi.org/insight/build-back-better-homes/

For CEC to establish a California Home Energy Labeling program that accelerates equitable housing decarbonization across the state, Earth Advantage provides the following high-level recommendations:

1) **Launch a home energy label that is useful and actionable for existing California homes.** According to US Census, there were over 14.6 million housing units in California in 2022, and nearly 120,000 housing units authorized by building permits statewide that same year. Getting new housing right from a climate and equity perspective is vital, if for no other reason than to prevent the need for home upgrades shortly after construction is completed, and Earth Advantage applauds the efforts CEC has undertaken to support climate-friendly new homes across the state. However, meaningful reduction of carbon emissions and energy costs is only possible through programs that also spur market demand for home energy upgrades in the 99% of California housing that is pre-existing. Many homeowners, buyers, and renters in existing homes lack needed information about how homes differ in terms of expected energy costs and how home energy performance can be improved in existing homes.
2) **Include DOE's Home Energy Score as a component within a California Home Energy Label.** Earth Advantage strongly recommends use of Home Energy Score as

a component of any home energy label issued in California, given its applicability to national market transformation efforts, design to be used across comparable homes in real estate transactions, and current use in the CPUC-funded BayREN Home Energy Score program. Home energy labels built off DOE's Home Energy Score can meet the Inflation Reduction Act (IRA) Home Efficiency Rebates requirement for a third-party verification and energy audit data reporting requirements. Rather than starting any label design or modeling engine from scratch, CEC can leverage DOE and BayREN investments in these areas to provide home energy labels that are nationally applicable *and* deliver California-specific information about electrification, demand flexibility, and decarbonization. As BayREN states in their comments, the CEC should develop a minimum set of standards that energy labels must meet in the state, rather than recreating an all-encompassing program that duplicates, and potentially conflicts with, existing mechanisms in the market. The CEC should coordinate with and learn from the experiences of existing program implementers in the space.

3) **Support CEC-approved home energy labels as a requirement for California home sale listings.** Currently, most homeowners, buyers, and renters have insufficient information about how their home uses energy and what factors contribute to poor energy performance, high energy costs, and high carbon emissions. A home energy labeling requirement would help educate consumers about these issues, help them protect themselves from high energy bills, and send more homeowners on a pathway toward decarbonization. Home energy labels can act as a roadmap for consumers that may not otherwise consider home energy upgrades and can serve as a mechanism to reduce customer acquisition costs for businesses and programs seeking to deploy these upgrades and government funds. A study from Lawrence Berkeley National Laboratory (LBNL 2022) found that when homes were required to disclose Home Energy Scores, each one-point increase in a home's score was associated with a 0.5% increase in sales price and 5.5% reduction in odds of 30-day mortgage delinquency. Home energy labels also foster availability of financing for home energy upgrades, particularly through mortgage financing products where borrowers can complete upgrades based on a home's as-completed predicted value. Earth Advantage recommends CEC align this rulemaking with BayREN's Home Energy Score Rebate program, which CPUC has put on a track to pilot a statewide Home Energy Score California program in 2026.
4) **Support CEC-approved home energy labels as a requirement for California rental home listings.** An energy disclosure rating system on all rental units would empower renters to understand the cost of utilities when deciding where to live. This would incentivize landlords to take advantage of energy efficiency and electrification programs and rebates to appear more attractive to prospective tenants, thus mitigating some influence of the split-incentive between landlords and renters on energy upgrade investments. In cases where tenants are income-qualified for the Equitable Building Decarbonization (EBD) program, these labels can serve as an

impetus for landlords to pursue government funding to support rental property upgrades.

Home energy labeling fits into a larger theory about driving growth of the clean energy economy through market transformation. Market transformation is a long and continuous process with changes that can be observed through market indicators. Market transformation efforts must recognize there is no one "market decider" that has direct control over the array of decisions that result in expanded market share of clean energy services. Instead, the culminating outcome of market transformation activities must appeal to the interests and needs of market actors - including homeowners, buyers, renters, lenders, and regulators - to justify their investment of time, money, and political capital.

Thank you for your time and attention reviewing these comments and the others submitted in response to this RFI. Specific answers to the listed questions from the RFI, as well as supporting background information informing these responses, are included on the following pages.

Sincerely,

Madeline Salzman
Head of Strategic Partnerships
Earth Advantage

RESPONSES TO RFI QUESTIONS

1) **What home energy rating and labeling services and programs currently exist?**

Home Energy Score™ Programs are characterized by implementation of the U.S. Department of Energy (DOE)'s Home Energy Score™ through DOE-approved partnerships. Designed as a "miles-per-gallon"-style rating system applicable to US housing, the Home Energy Scoring Tool can be utilized as a building block within standardized home energy assessments for various programs operated by state and local governments, nonprofit organizations, and private companies. Nationally, more than 100 businesses actively work to deliver Home Energy Scores through over 30 public and private partner organizations. As of February 2024, over 235,000 Home Energy Scores have been delivered nationwide.

The Home Energy Scoring Tool itself began development in 2010 and has undergone more than a decade of software updates and enhancements since its initial release in 2013. Based on approximately fifty data inputs regarding a home's features, as well as various input datasets and modeling assumptions, the Scoring Tool produces an output report with overall Score, modeled energy use metrics, and recommended home energy upgrades. Home Energy Score outputs include an 8760 hourly load calculation based on DOE's flagship building energy modeling software, EnergyPlus™. More information about how Home Energy Score works is available on DOE's website.

Home Energy Score can help build value for home energy efficiency among homeowners, home buyers and renters, financiers, and regulators. For the homeowner, Home Energy Score provides home-specific data, including actionable recommendations for energy-saving improvements that can save money, improve thermal comfort, and increase resale value. For prospective home buyers and renters, Home Energy Score disclosure can help residents understand the potential energy costs of a property, which directly affects overall affordability. As an asset rating, Home Energy Score provides information on expected energy costs for a particular home, while controlling for occupancy size or behavior. This provides energy cost estimates that control for occupant behaviors and allows for a "less noisy" data comparisons between homes.

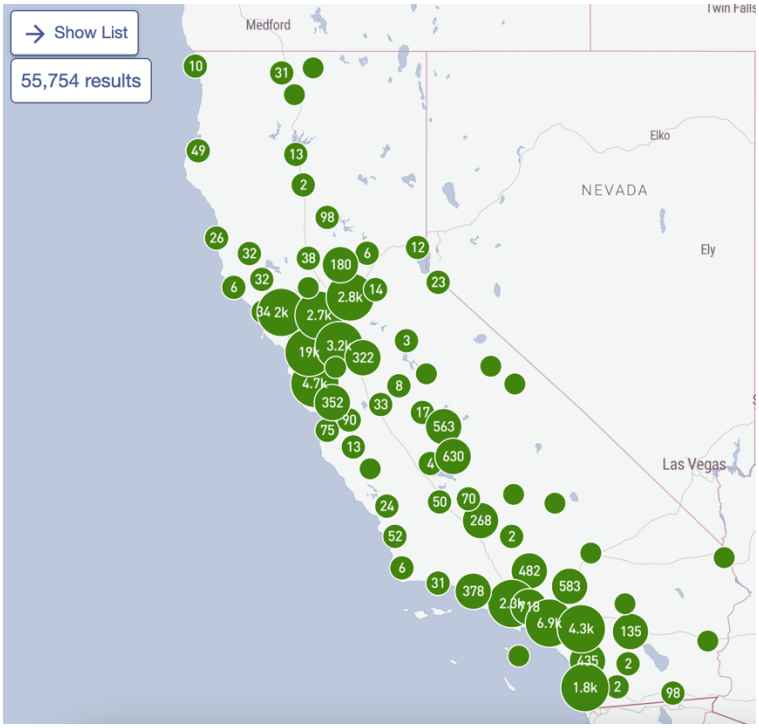
For the lender, Home Energy Score can translate into real home value, which can extend equity for homeowners to borrow against for completing home energy upgrades. Home Energy Score documentation of higher home performance can also be a trusted source for underwriters to sell mortgages on the secondary market for a green premium. The market for green mortgage backed securities (MBS) in the multifamily market is already well established, and through Home Energy Score can be expanded to include existing single-family mortgages as well. Finally for the regulator, Home Energy Score can be used to understand the nature of energy burdens across the state, prioritize communities based on need, and quantify the needs in housing today to minimize energy burden, electrify, or decarbonize. For many households, regulator-enabled funding and financing resources are

necessary to make home energy upgrades accessible, and identifying these households and their needs will help assure no one is left behind in decarbonization efforts.

In summary, the Home Energy Score is more than a 1-10 metric. It is a technical system based on hourly building energy modeling calculations that are developed and maintained by a dedicated team of staff at DOE and three national labs. It is a program that includes training requirements, quality assurance protocols, and is administered by established providers and practitioners. It is a partnership of local and state governments working to make improvements and test new permutations and methods of deployment. It is a nationally applicable foundation that supports local policies designed to meet local needs.

a. Which existing programs are the most developed or have completed the largest number of ratings?

Earth Advantage owns and operates a green home data tool called the Green Building Registry® (GBR), which is designed to connect green home certification records to real estate databases and housing decisionmakers to inform investment decisions and program designs. At time of writing, this is the largest database of green home certification records across the United States, with over 3 million records included. Green Building Registry is used by real estate multiple listing services (MLS) across the country, as well as by national tax/public records data providers. While this selection of records is not exhaustive, it does represent a large subset of delivered home energy certifications across the country that have taken efforts to allow for database aggregation and accessibility for purposes of driving market demand for improved home energy performance. Using GBR as a resource, we find over 55,000 green home records within the state of California[1]. Over 22,000 of these records are US DOE Home Energy Scores, as well as thousands of RESNET Home Energy Rating System (HERS) Ratings, GreenPoint Rated



[1] Earth Advantage has been in communication with CHEERS and CalCERTS to discuss including CA-HERS data in the Green Building Registry, however this data is not currently included.

Homes, ENERGY STAR Certified Buildings, and LEED homes and buildings. A screenshot of GBR data in California from February 2024, is also included.

The over 22,000 Home Energy Scores in California were created through the BayREN Home Energy Score Rebate Program, as well as the City of Berkeley and City of Piedmont Home Energy Score policies. Since its inception, 7.8% of the BayREN Home Energy Scores have been delivered in Berkeley and Piedmont–cities which represent 1.9% of the Bay Area housing stock. Earth Advantage supports the BayREN program through assessor oversight, database management, and customized home energy label generation.

StopWaste, an Alameda County Government Agency, became a Home Energy Score partner to support the City of Berkeley's Building Emissions Savings Ordinance (BESO), which required Home Energy Scores be included in real estate transactions. For decades, Berkeley required prescriptive energy upgrades to buildings at time of sale and in 2015, the policy (formerly known as the Residential Energy Conservation Ordinance or RECO) was updated to focus on disclosure. In 2020, the BESO ordinance was updated to require Home Energy Scores in property sale listings to help increase the visibility of Home Energy Score data for prospective buyers before they have committed to a transaction. In 2021, the City of Piedmont passed a similar ordinance to the City of Berkeley requiring an energy audit at time of listing a home for sale, under which Home Energy Score is one compliance pathway. Other cities around California have approached StopWaste about supporting their efforts to adopt Home Energy Score disclosure policies.

Earth Advantage notes that any program's success in seeing uptake in the context of new construction labeling may not mean it is necessarily the best fit for existing homes. Existing home labels usually cannot provide as much detail as those for new homes because wall construction assemblies are sealed off, construction records are often no longer available, and a variety of difficult to verify home upgrades may have been completed since construction. Across the country, Energy Rating Index (ERI) ratings, particularly the RESNET HERS, have been widely adopted for labeling new homes, in part because it has been accepted as a pathway for modeled energy code compliance and new home green certification. However, adoption of ERIs as a label component for existing homes has remained minimal, and the ERI's core rating comparison between the home as-built and a code-built reference home may be less relevant to the intended audience for an existing homes program.

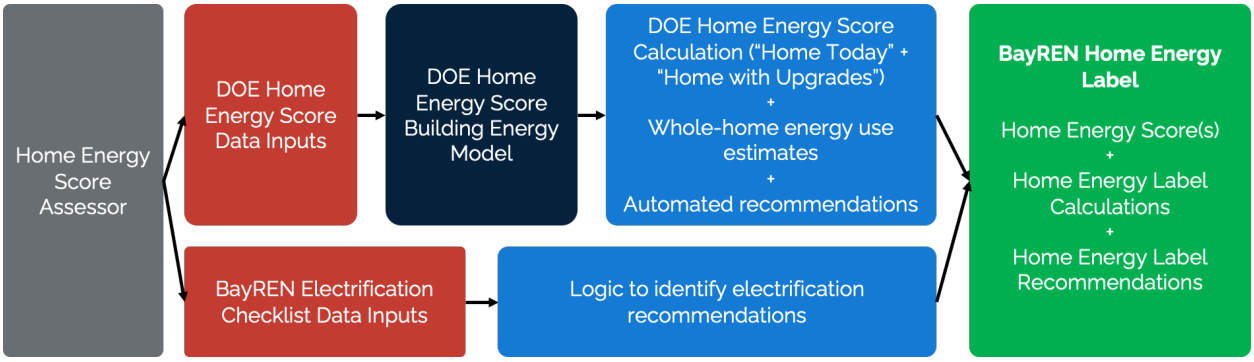
b. Which existing programs successfully promote consumer awareness and education on the monetary and or environmental benefits of energy efficiency?

BayREN's existing Home Energy Score program has gone through updates to support consumer education about the benefits of energy efficiency. The program label is built on DOE's Home Energy Scoring Tool, which includes a consumer-tested 1-through-10 score,

which serves as a relative proxy for the home's estimated total energy costs. DOE's Scoring Tool also provides recommended home energy improvements that are estimated to payback in ten years or less, and estimates the energy usage, cost, and emissions savings associated with these recommended improvements.

Beyond the DOE Home Energy Score modeling engine and metrics, the BayREN Home Energy Label also includes additional data and metrics aligned with BayREN program priorities. BayREN developed a voluntary electrification checklist for Assessors to use when gauging whether a home may be a good candidate for electrification upgrades. Beginning in 2023, Assessors who fill out the electrification checklist addendum are eligible for an additional $50 rebate. The electrification checklist data and any associated recommended improvements are also included in the BayREN energy label. A local home inspector had this to share about the program: "*As an assessor, I have mentioned several times that this is a fantastic supplement to a typical home inspection (from a Building Inspector/Home Inspector) point of view. It is gaining increasing recognition in SF in that buyers are required to be notified of the resource by the SF Association of Realtors in their disclosure documents in transfer of sale of property.*"

BayREN Home Energy Score System Workflow.



c. Which existing programs promote energy-efficient construction practices?

DOE's Home Energy Score provides a building energy model estimating the energy usage, costs, and emissions associated with a home's energy use in a typical weather year and with standardized user assumptions. It also provides recommendations for homeowners to install energy efficient upgrades, including increasing insulation, installing air sealing, and increasing the efficiency of the home's heating, cooling, and hot water systems. By providing recommendations and supporting valuation of these improvements, Home Energy Score supports growing adoption of energy efficient construction practices in existing home upgrades. A program administrator has the flexibility to identify additional recommendations beyond what the DOE system identifies as having 10-year pay backs. That recommendation logic can be developed in alignment with the program's goals, for example decarbonization rather than just efficiency gains.

d. Which existing programs increase compliance with building standards?

As BayREN notes in their comments, the role of code compliance and market education should not be conflated, but rather supported and deployed for the right audiences. Additional research is needed to determine whether asset rating programs increase compliance with building standards when compared to prescriptive checklists. As a tool that compares a building's construction to energy code, ERI ratings provide a flexible pathway for builders to achieve needed performance levels. By contrast, Home Energy Score is designed to serve as a tool to understand home energy costs, savings potential, and associated carbon emissions for non-energy professionals. Many existing Home Energy Score programs, like BayREN's, produce customized upgrade recommendation reports that include original Score data, but go beyond state and/or local code compliance requirements with more specific recommendations.

e. Which existing programs are recognized by appraising and lending communities and may result in higher real estate values?

In general, for any home energy labeling program to be recognized in appraisal or lending practices such that they can result in higher real estate values, the label must either be frequent enough in the marketplace to allow for sales comparisons, or specialized enough that the label itself clearly demonstrates the home's unique qualities that are generally rare and desired in the housing stock. In both cases, the label itself must be accessible within real estate listings in order to be understood to have impacted the buyer's decision. Oftentimes there is a need for real estate professional education so they can accurately understand the home energy label information. Because Home Energy Score is designed to be used across existing homes, it has high potential for widespread adoption such that it can be used as a datapoint when comparing similar homes. In the original development of the metric, focus groups conducted in multiple markets showed that potential buyers and sellers preferred a 1-10 scale to a A-F scale.

In recent years, a few studies have shown that when home energy information is available to home buyers and renters, they value this information and use it as a component in their decision making. A study from Lawrence Berkeley National Laboratory (LBNL 2022) found that when homes were required to disclose Home Energy Scores, each one-point increase in a home's score was associated with a 0.5% increase in sales price and 5.5% reduction in odds of 30-day mortgage delinquency.

Studies have also found Home Energy Score's 1-to-10 scale to be intuitive to users that may not be well versed in the program or energy features.

Relevant studies:

- LBNL (2022) study of Home Energy Score impact on real estate market transactions: https://eta-publications.lbl.gov/publications/how-does-home-energy-score-affect
- ACEEE (2020) study of the impact of home energy information, including Home Energy Score, on mock real estate listings: https://www.aceee.org/research-report/b2002
- American Economic Journal published study (2022) exploring the impact of mandatory energy efficiency disclosure in real estate markets: https://www.aeaweb.org/articles?id=10.1257/pol.20200539
- ACEEE (2022) study of the impact of home energy information, including Home Energy Score, on mock rental listings: https://www.aceee.org/research-report/b2204

2) What asset rating tools and software can be used to generate home energy ratings and labels?

The DOE's Home Energy Scoring Tool is available for free online for any home energy professionals that have completed DOE's free, online training and that are working under a partnership to provide quality assurance and oversight. Twelve market-based software providers have completed API integration with the Home Energy Scoring Tool. The list of integrated energy assessment software is on DOE's website: https://betterbuildingssolutioncenter.energy.gov/home-energy-score/home-energy-score-partners-partner-resources

Guest users seeking to understand how the Home Energy Scoring Tool works can use guest access to create unofficial demonstration scores here: https://guest.hescore.labworks.org/guest-access

a. What dwelling types can these tools assess – single family, low-rise multifamily, high-rise multifamily, mixed-use buildings?

Home Energy Score is designed to assess energy usage of individual residential units. Historically, Home Energy Score was designed to be used in single-family detached and attached dwellings, however more recent software updates that are currently underway will result in changes allowing Home Energy Score to also assess manufactured homes and residential units in low-rise multifamily buildings. Mid- and high-rise multifamily buildings have more common systems and shared partition surfaces that require more complicated building energy physical algorithms and thus are better served with commercial building energy assessment software. Commercial building energy assessment software, including DOE's building energy asset score and audit template, are useful tools that can model energy usage in larger multifamily and mixed-use buildings.

b. Are these tools capable of assessing performance, assets (independent of performance), or both?

At time of writing, DOE's Home Energy Score produces a building energy model based on a home's assets but does not incorporate energy utility data. It is possible DOE will enable utility bill calibration through Home Energy Score in response to the Inflation Reduction Act Home Energy Rebates, however this functionality is not yet in production.

Generally, Earth Advantage recommends use of asset scores for the purpose of influencing real estate transactions rather than using energy performance (e.g., utility bill) data. There are few reasons for this: (1) Disclosure of energy bills in real estate listings can present a greater challenge, as often energy bills are considered private data that are not meant to be shared. If energy data is not included in the real estate listing, then it is very challenging for appraisers to justify use of this data in their home appraisal. (2) Energy bill patterns are not only influenced by the home, but also by the resident and their behavior. Real estate professionals want assurance any assessment of home value and needs are tied to the property itself and not the previous owner. (3) Beyond simple resident behavior, various economic, weather, and occupancy factors also greatly influence energy bills. For instance, low-income residents may opt to "under use" energy services in the home to save money, but adjusting for this factor when attempting to represent the home's features accurately can be a challenge. Similarly, homes that are occupied only seasonally, vacation properties, or vacant properties may not have energy bill patterns that will be meaningful for the next homeowner or resident. Even if a program tries to control for these variables, these variables are not verifiable through a quality assurance program, which can make it harder to prevent gaming of the rating system.

c. What inputs are required to generate home energy ratings?

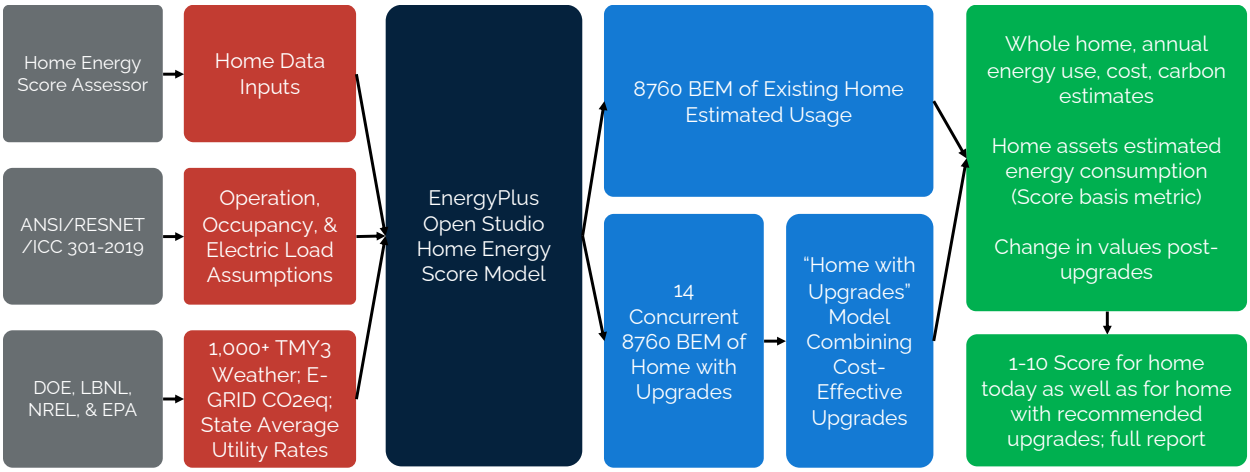
The table below gives a summary of the data inputs and outputs for a DOE Home Energy Score. In total Home Energy Score collects about fifty data points in a home to assess these features.

Collected Data	Home Energy Scoring Tool Data Outputs
• Home conditioned floor area • Home age • Home window area • Average ceiling height • R-value of building envelope features • Air exchange rate of building envelope (optional) • Efficiency ratings / ages of HVAC equipment • Efficiency ratings / ages of water heating equipment • Duct locations and insulation, air	• 8760 model of home energy end-uses based on assets and standardized user and weather assumptions • Estimated whole-home annual energy consumption (total and by fuel type) • Estimated whole-home annual energy costs • Estimated whole-home annual carbon emissions • Home Energy Score today (1-10) • Home Energy Score with

sealing status • Solar PV system presence, size, age	recommended improvements (1-10) • Recommended improvements list based on cost-effectiveness assessment

d. What assumptions and/or boundaries are assumed by these tools?

Wherever possible, Home Energy Score leverages industry standards for underlying modeling assumptions. This was an intentional effort to minimize variables causing market confusion between different home energy assessment tools in the market. These underlying assumptions are included in the schematic below.



DOE conducts regular updates to the Home Energy Scoring tool to use as accurate underlying assumptions as possible. It is also possible for API connected Home Energy Scoring Tool software to post-process data outputs to adjust assumptions for a local program. For example, Earth Advantage's Green Building Registry uses more localized utility energy rate and carbon emission assumptions and applies these assumptions to DOE's building energy modeling outputs.

e. What calculations or algorithms are used to generate the ratings?

Based on approximately fifty data inputs of a home's features, as well as various input datasets and modeling assumptions, the Scoring Tool produces an output report with overall Score, modeled energy use metrics, and recommended home energy upgrades. Home Energy Score outputs include an 8760[2] hourly load calculation based on DOE's

[2] Named for the fact that there are 8,760 hours in a year, an 8760 hourly load calculation includes physics-based building energy modeling for each hour of a year, with variance based on typical meteorological year version 3 (TMY3) weather data inputs. Output datapoints from Home Energy Score include energy load estimates by end-use fuel for all 8,760 hours.

flagship building energy modeling software, EnergyPlus™. The approximate data flow of the Scoring Tool itself is illustrated in Figure 1. More information about how Home Energy Score works is available on DOE's website.

3) **What are the most important elements to creating a successful home energy rating and labeling program?**

Generating more home energy labels is not necessarily the end goal for programs. The "better world" we envision is not simply one filled with home energy labels with no resulting actions from homeowners, financiers, or regulators. Instead, the desired outcome is for labels to spur action among housing and energy sector stakeholders. In alignment with statewide energy and housing goals, a successful home energy labeling program should provide relevant and useful home energy data to homeowners, buyers and renters, lenders, and regulators to spur housing decarbonization across California. Many existing home energy labeling programs are established to support overall home energy efficiency market growth, including the BayREN program.

To achieve this end, it is important that the program enables market valuation of energy efficient home features, such that new people and new funding sources recognize the value of home energy upgrades and the costs associated with un-upgraded homes. Overall program objectives should be to:

- Demonstrate the value of home energy upgrades to homeowners (both owner-occupants as well as landlords) such that they sustain market demand for these upgrades.
- Provide transparency of estimated energy bill costs, particularly to home buyers, renters, and low-income homeowners, to protect consumers from high and unexpected homeownership and tenancy costs.
- Demonstrate the value of home energy upgrades to financiers and underwriters such that they provide low-cost and low-risk capital to borrowers.
- Demonstrate the value of continued public and utility-based funding for home energy upgrades in low-income and poor credit households across the state, particularly in frontline energy justice communities.

Achieving these objectives helps draw in these funding resources to support home energy upgrades. Significant investments, including funding, workforce development, and demonstrating the value of disclosure, are needed to achieve market transformation to decarbonize housing.

4) **How specific and accurate do home energy ratings need to be?**

This is an important question for CEC to consider. Home energy labels should be accurate enough to be reasonably trusted in the market, which may require establishing and communicating a sense of expected error within the program. When attempting to communicate home asset value to real estate audiences, accurate representation of the

home itself is far more important than model calibration tailored to a specific home resident. DOE has attempted to manage specificity and accuracy in a few different ways: (1) DOE intentionally uses a 1 through 10 scale for the rating because a more granular score may result in a false sense of precision that is more granular than what is reasonable with the level of data collection being performed. (2) DOE provides explanatory documents – like the fact sheet titled, "What Does My Score Mean?" to help people understand the content and limitations of the Home Energy Score report. (3) DOE has focused efforts on producing models that are reasonably unbiased, even if they cannot be expected to accurately predict energy bills. Limited bias when comparing score results to energy bills suggests the tool is not skewing overall high or low, but rather shows there are other variables in the system. Earth Advantage notes that a government sponsored program is less likely to convey false precision with results or skew results to provide preference to certain technologies.

An important consideration here is that narrowly accurate prediction of any person or home's energy bills is not a reasonable output from a home energy labeling program. Resident occupancy, temperature set points, behavior, income status, and other factors will contribute to overall energy usage patterns. A home energy label that provides useful information in real estate transactions intentionally controls for these variables so the results can be understood regardless of who the next resident is. A person that is likely to be a high energy user will likely still use less energy in a higher scoring home than a lower scoring one, so the label can still be useful for gauging relative energy cost impacts. A well-designed model will limit bias so high energy using individuals and low energy using individuals have similar experiences with the label itself.

5) **What metrics/units are most important to include on home energy ratings (e.g. energy bill costs ($), energy (kWh, Therm, BTU), energy use intensity (KBTU/ft^2-year), greenhouse gas emissions (CO_2e)? Should these units be normalized by floor area?**

A variety of information is going to be useful and meaningful to different users. Consumer behavior research suggests that the rating itself is quite useful for users to gain a relative understanding of energy use (see ACEEE papers included as links in the answer to question 1e). In addition, most homeowners, residents, and real estate professionals, especially appraisers, will benefit from energy cost data. Mortgage underwriters interested in green mortgage-backed securities want to have access to carbon emissions data. Additional metrics can be useful to produce and to conduct analysis but are less likely to drive decisions for key actors to invest in energy efficiency performance.

These metrics should not be normalized by floor area, which creates inherent bias toward better ratings for large homes and worse ratings for smaller homes. Instead, Earth Advantage recommends from an equity perspective that the metric be able to serve as a proxy for home energy costs, which is a far more relevant metric to most home residents.

6) **What are known or possible barriers to providing reasonable estimates of potential utility bill savings, and reliable recommendations on cost-effective measures to improve the energy efficiency of homes? Are there examples of existing programs that have overcome these barriers?**

Because home energy labels are designed to allow any prospective home resident to fairly compare homes in terms of their energy features, they will not perfectly reflect expected bill savings based on a specific person's usage patterns. If a homeowner is particularly concerned with taking on an upgrade based on cost-effectiveness, they may benefit from an energy audit that includes utility bill calibration after they have moved in and lived in the home.

If a homebuyer wants to invest in upgrades that are likely to be cost effective and that will improve their home's score at resale, along with providing other potential comfort and health benefits, then they can move forward with home energy label provided recommendations.

7) **There are many different rating scale systems that could be used (e.g., 1 through 10, 1 through 100, grades A, B, C, etc.). Should a scaling system be considered? If so, what scale and labeling system should California's home energy rating and labeling services learn from and why?**

Earth Advantage recommends CEC review research conducted on DOE's Home Energy Score, which has found the 1-through-10 scale to be easy to intuit even for new users not previously familiar with the program.

Europe's EPCs use a letter grade system, typically ranging from AA to G. DOE found the emotional response users had to letter grades was not always useful to supporting investment, particularly as it evoked stronger opposition to the risk of getting a poor rating.

8) **How can California's home energy rating and labeling services rate both newly constructed dwellings as well as additions and alterations to existing dwellings on the same rating scale?**

Earth Advantage recommends CEC review how this is currently being managed in cities in Oregon that have receive Home Energy Scores for both new and existing homes. ERI software providers can connect with the Home Energy Score API to allow for seamless delivery of both systems when needed.

Earth Advantage has also supported Missouri's home energy label, which is flexible to show either a HERS rating or Home Energy Score on the label depending on which has been created for the home. In these cases, Earth Advantage recommends highlighting common metrics that are available on the label, such as the home energy cost metric.

9) **How can the CEC encourage adoption and use of a voluntary home energy rating and labeling services?**

In Earth Advantage's experience, voluntary labeling programs are most successful when they are either incentivized directly or when delivery of home energy labels is embedded into Assessor's business-as-usual practices, either as a standard home energy assessment offering or a component of a state, local, or utility managed program. In the case of the BayREN program, voluntary Home Energy Scores receive a $200 rebate, which has helped foster the market for these scores.

Earth Advantage notes that voluntary programs may need to take on extra activities to support voluntary label disclosure to assure energy information is being provided to real estate actors.

10) **How can the CEC ensure the benefits of home energy rating and labeling services are equitably distributed to California's low-income and disadvantaged communities?**

There are many important strategies CEC should take on to assure home energy labeling benefits reach low-income and disadvantaged communities. In Earth Advantage's experience, these include: (1) Setting aside a fund to help cover the costs of home energy labels for low-income households. (2) Providing home energy labels at no cost to low-income households participating in weatherization and home energy upgrade programs. (3) Support efforts to exclude government-covered home energy upgrades from being included in home tax assessments. (4) Supporting home energy label generation in multiple languages. (5) Supporting workforce development opportunities for low-income and disadvantaged workers to be a part of job opportunities in home energy labeling.

11) **Should California's home energy rating and labeling services provide a process for accepting other third-party rating systems to be recognized by the CEC? How could this be technically achieved considering programmatic differences?**

Earth Advantage believes that across the board, there needs to be some underlying common metrics that make home energy labels directly comparable, even if different approved labels provide some different information. For instance, even if CEC allows for different rating systems, requiring all labels to provide energy usage, emissions, and energy cost metrics could be a way to support comparability and consistency across the market.

12) **What role(s) should field professionals or assessors have to support California's home energy rating and labeling services?**

Earth Advantage believes home energy labeling can be an early-career job opportunity that sets up workers for career pathways in residential construction and high road clean energy

jobs. Therefore, supporting home energy label providers as professionals – with professional certifications and training requirements – is a useful way to support high road career opportunities. Home energy labels can be a way for home inspectors, appraisers, energy auditors, and other housing professionals to diversify their services and gain skills applicable to the clean energy economy.

a. Is there a need to certify these individuals or entities? If so, what knowledge and skills do these professionals need to possess?

Earth Advantage believes that home energy labeling workers should have many of the skills generally associated with conducting home energy audits. Earth Advantage recommends following DOE's Home Energy Score minimum knowledge and skill standards, which require some base knowledge in home energy systems as well as knowledge about how to consistently enter data in a standardized way across homes.

b. Who should certify these individuals and entities? Should these individuals and entities be regulated?

Earth Advantage recommends California follow the example of the requirements the State of Oregon has set for home energy label providers. These requirements build off DOE's Home Energy Score assessor requirements – which include a pre-qualification credential, online training, and a mentoring session – to also require licensure and insurance. Business requirements are particularly important to protect workers providing information that is intended to be used in real estate valuation.

c. How can the CEC ensure there is an adequate and well-qualified workforce to provide statewide coverage of home energy rating and labeling services?

Earth Advantage has found that when home energy labels are required elements of programs – either required disclosure for real estate listings or required elements of home efficiency programs – and these requirements are enforced, programs do not struggle to meet workforce requirements. Earth Advantage has observed that when businesses can assure the market demand will be sustained (because requirements exist and are enforced) they can charge competitive yet profitable prices for completing this work. If workers that are skilled to provide home energy labels can make more money in a different job, then there will be problems meeting staffing needs. Assuring workers can make competitive wages in these roles, and/or can work in these roles as a career steppingstone to high road careers will be important to meeting workforce demands. In the Bay Area additional assessor recruitment was needed in specific communities. That recruitment was successful and the number of scores delivered to those communities increased in that voluntary program after new assessors were onboarded. The BayREN program has trained and

mentored over 200 assessors since the program's inception to generate Scores throughout all nine Bay Area counties.

13) What level of quality assurance is warranted for voluntary home energy rating and labeling services in California?

Earth Advantage recommends CEC establish a quality assurance standard that is no less than that of DOE's Home Energy Score program (5%). As a new program works to build trust with homeowners, buyers, renters, and the real estate community, a higher rate of quality assurance may be warranted. A sophisticated program could potentially maintain a lower rate of quality assurance review if data analysis tools can identify and flag data collection trends.

14) What is an acceptable cost for completing home energy rating and labeling services in California?

BayREN offers rebates for Home Energy Score in the nine Bay Area counties, outside of City of Berkeley where rebates are not offered. As of 2023, the rebate for a Home Energy Score is $200. In the city of Berkeley, a Home Energy Score typically costs households about $350.

Based on Earth Advantage's work supporting home energy labeling programs around the country, regions where home energy labels are a required element of local policies or programs tend to experience lower market prices for home energy label assessments. This is because the price per score or label tends to get cheaper as a steady stream of business becomes reliable in the area, and as policies spur healthy competition between label service providers. This trend has been observed in the Bay Area as well.

15) What other valuable information should be included as part of California's home energy rating and labeling services?

Research and promote the benefits of home energy label disclosure. CEC should explore and promote findings related to potential impacts of disclosure requirements for home energy labels in real estate listings, real estate transactions, and rental listings. In this effort, CEC could evaluate impacts associated with the Home Energy Scoring requirements in Berkeley, Piedmont, as well as the voluntary Home Energy Score program across the rest of the Bay Area.

Support development of green home upgrade lending programs and products. Alongside these efforts, CEC should dedicate resources to making sure the value of CEC-approved Home Energy Labels is known among real estate and financing stakeholders across the state. These efforts should include establishing a financing roundtable and

coordinating access to aggregated home energy label data to mortgage underwriters, who are interested in expanding green lending into single-family home upgrade markets.

Expand California's rule for Active Solar Energy System Exclusion to include other home decarbonization features. Effective since 2014, the California Board of Equalization allows for exclusion of active solar energy systems from calculated home values for property tax assessments. This allows homes to install active solar energy systems without risking resultant increases in property assessment taxes, which would act as a disincentive toward solar installation. Similarly, low-income homeowners should be protected from potential property assessment tax increases attributable to government-funded home energy upgrades, so Earth Advantage recommends CEC work with the Board of Equalization to establish similar exclusions for other decarbonization technologies.

16) What organizations or stakeholder groups should be made aware and invited to participate in the home energy rating and labeling proceeding?

- BayREN Home Energy Score program administrators and participants
- US Department of Energy Home Energy Scoring Program Team, including relevant national laboratory staff
- California Green New Deal Coalition
- California's Healthy Homes Working Group