

CITY AND COUNTY OF DENVER'S



Home Energy Score Executive Summary

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DENVER
CLIMATE ACTION,
SUSTAINABILITY &
RESILIENCY



U.S. DEPARTMENT OF ENERGY
Home Energy Score Partner



INTRODUCTION

In the spring of 2018, the City and County of Denver's (Denver) Department of Public Health and the Environment (DDPHE) launched a home energy label pilot program using the U.S. Department of Energy's Home Energy Score™ (the Score) to generate the label. Overall, the Score pilot program seemed to increase awareness about home energy efficiency for many participants; however, receiving a Score report alone didn't necessarily ensure that homeowners would take immediate action resulting in significant energy savings. The Score helped provide homeowners with information that may help them better understand opportunities to reduce energy use in their homes, as well as gave the City a way to assess homes consistently across the pilot and understand how this Score and other tools can help reduce residential energy use across the City.

As 91 percent of initial survey respondents (representing half of all participants) believe that energy information should be highlighted during the home transaction process, this illustrates that there is a need for Denver to support consistency with how home energy efficiency features are described and highlighted to ensure that the language used is standard across the housing market. In the future this common language and labeling may reveal a clearer path for requiring the disclosure of energy information during the transaction process. Based on this analysis, Denver may be able to utilize a customized version of the Score in combination with other strategies to increase residential energy efficiency in the future.

The pilot program sought to understand whether receiving an energy label during the transaction of a home could increase energy efficiency in single-family residential buildings in Denver. DDPHE was also interested in understanding whether an energy label would be helpful in meeting some of the residential sector goals laid out in [Denver's 80x50 Climate Action Plan](#), specifically:

- Reduce energy use in single-family homes by 10 percent by 2025.
- Reduce energy use in single-family homes by 20 percent by 2035.

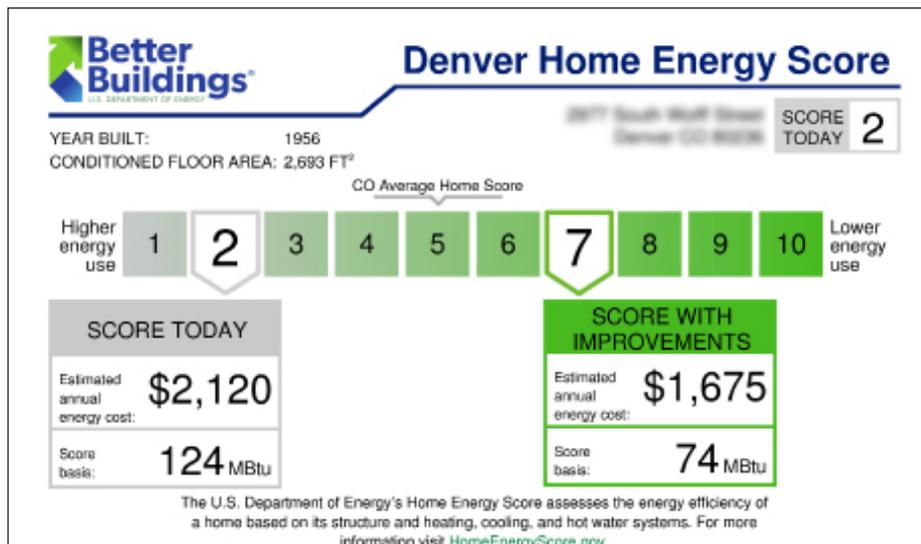


Figure 1: Example of a Home Energy Score report.

- Establish a home energy rating for all single-family buildings so that owners, renters, and potential buyers can make informed decisions about a home's efficiency and operating costs.

The pilot program will continue to run through the end of 2019 and the intent of this analysis, which was conducted in late fall 2019, is to understand the impacts of the pilot and identify if and how Denver can use a home energy label to support greater residential energy efficiency.

Specifically, this analysis seeks to answer the following questions:

- A. Does sharing an energy label around the transaction motivate efficiency investments sooner with sellers, buyers and/or new owners?
- B. Does sharing the Score with sellers, buyers, and new owners result in energy savings?
- C. What are the opportunities and challenges related to using the Score as a tool to encourage energy efficiency?
- D. Is the Score the right tool for Denver to encourage residential energy efficiency?
- E. What are the next steps for Denver regarding energy labels?



BACKGROUND ON AN ENERGY LABEL

DDPHE's pilot program specifically focuses on the ability to highlight a home's energy efficiency features using the Home Energy Score™ tool, developed by the U.S. Department of Energy (DOE) in collaboration with the national laboratories. The Score is a specific type of asset-based home energy label aimed at providing home owners, sellers, buyers, and renters with comparable information about a home's energy use by rating a home on a 1-to-10 scale based on a standard assessment that can be compared across the housing market. Home energy labels are similar to a miles-per-gallon rating for a car. While actual energy used in a home is not factored into a label (including the Score), the fixed assets of the home (such as the square footage, building materials, insulation levels, and major fixed equipment like furnaces and water heaters) are modeled through building energy software to estimate home energy performance. Occupant behavior is not factored into an asset score though it still plays a part for overall energy use in a home.

The Score employs a building energy model as it is designed to be a best-fit tool for real estate transactions. Oftentimes energy usage data cannot be utilized in real estate transactions because the data is private. Home energy label programs were developed to address a lack of homeowner and renter awareness and provide information on the energy performance of home and features being bought or sold in a real estate transaction. By using energy disclosure to increase the visibility of home energy efficiency and standardize

the way that a home's efficiency features are assessed and communicated, a home energy label has the potential to leverage market forces to drive efficiency improvements.

Several states and cities have developed voluntary or mandatory home energy labeling policies. Under a mandatory requirement, energy disclosure is required at the Time of List (i.e., when a home is listed publicly for sale) or Time of Sale (i.e., before the home is purchased, typically at closing). Mandatory disclosure could also apply for rentals at Time of Lease.

ANALYSIS OF WHAT CAUSES A PARTICULAR SCORE

Year Built & Structure

Starting with homes that scored a '4' in the pilot, the trend is the average home receiving each Score to have been built roughly a decade later. In other words, the average home scoring a '4' was built in the 1940s, the average home scoring a '5' was built in the 1950s, etc. Upon further analysis, there were many outliers indicating while year built can be correlated with the Score, there is not a direct causal relationship between the two. In fact, it is important to note that in addition to the year built, there are underlying variables such as wall structure or common building practices at the time that also contribute to a home's Score. Of approximately 250 houses in the pilot scoring less than a '4', 210 of them had structural brick or concrete block walls with no insulation which were drivers of a lower score due to a lack of wall insulation based on the home's structure.

Heating Fuel Type and Utility Rates

While there is not enough data to be statistically relevant to support a direct causal relationship between a home's heating fuel type and initial Score, there is evidence to suggest that obtaining a higher Score with improvements may come with longer payback periods in order to achieve higher Scores. This is based on lower natural gas costs in Denver, which provided little opportunity to demonstrate significant cost savings from upgrades in Denver Score reports.

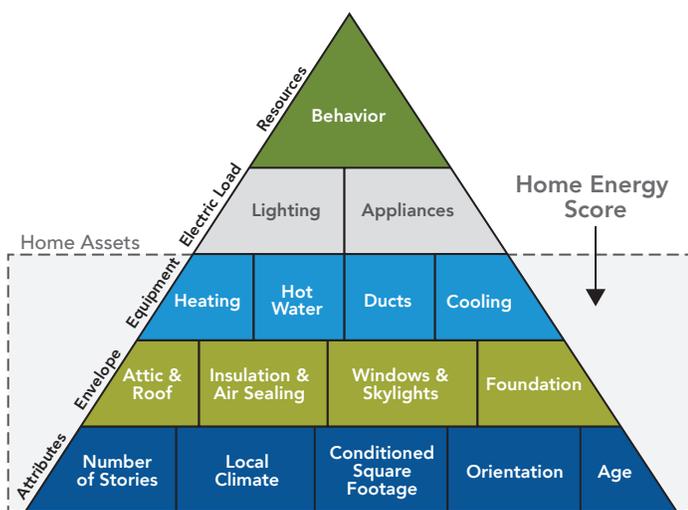


Figure 2: Components included in the Score and similar asset-based energy labels.



PROGRAM RESULTS

Participation

As of September 26, 2019, a total of 599 homes had received a Score at the time the data for this analysis was pulled. By the time data for this analysis was pulled nearly 26 percent of original requests for a Score had not been completed; this was due to the fact that the homes were either not eligible to receive a Score because the homes were not Denver’s target audience for the pilot, the property was a stacked multifamily unit, the requester was no longer interested or unresponsive when contacted about scheduling an assessment, or the assessment simply hadn’t occurred yet. DDPHE conducted extensive outreach to home buyers, sellers, and new owners to inform them of the pilot program and eligibility to participate. New owners (i.e., those who recently purchased a home in the last 12 months) were targeted utilizing data from the multiple listing service (MLS). It is worth noting that the primary target audience of the Score is focused more on sellers and buyers rather than new owners to better inform the transaction and opportunity to highlight a home’s energy efficient features, but new owners were the audience that was most accessible based on the available data and outreach channels.

Scores

Compared to homes that have been scored nationally, the homes scored in Denver have received slightly lower Scores. Based on data provided by the DOE, overall homes scored in Denver have an average initial Score of 4.3 and an average potential Score of 6.0; this compares to an average initial Score of 4.7 and potential Score of 7.1. Compared to Denver, homes receiving a Score nationally tend to have a more ‘mobile’ Score, meaning that there is a greater likelihood of the Score increasing if recommendations are implemented. For example, homes scoring a ‘1’ for their initial Score in Denver have a 25 percent chance of remaining a ‘1’, whereas nationally these homes only have a nine percent chance of remaining a ‘1’.

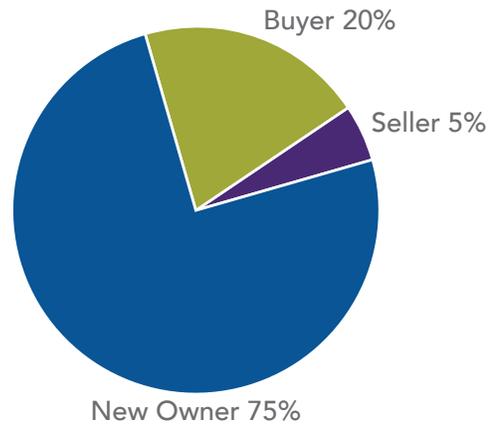


Figure 3: Stakeholders receiving the Score.

Upgrades

A total of 304 participants responded to an initial survey after receiving their Score report. Of those participants, 267 responded to a survey question regarding whether they plan to implement upgrades based on the recommendations in the report. Of those who responded to the survey, nearly 77 percent indicated that at some point they plan on implementing one or more of the recommendations, and an additional 10 percent indicated that they have already implemented one or more upgrades. Across all homes in the pilot the average number of recommended upgrades was just over two. Homes receiving a Score of a ‘1’ had, on average, nearly five recommendations included in the report, while homes scoring a ‘9’ or a ‘10’ had less than one recommendation included in their reports on average. As one may expect, the average number of recommendations decreases with each increase in the Score. The most common recommended upgrade was a water heater replacement,

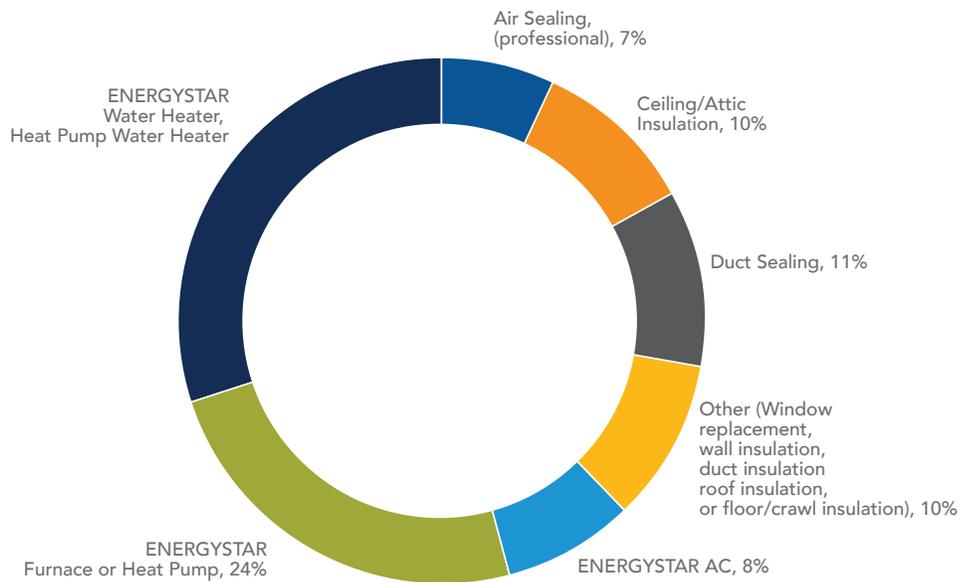


Figure 4: Most commonly recommended upgrades in Score report.



which constituted 30 percent of all upgrades, followed by a furnace replacement, which constituted 24 percent of all upgrades.

Based on this analysis, the average cost savings per household if all recommendations were to be implemented was \$191.80 per year. There was significant variability in the cost savings for the most frequently recommended upgrades, and at times these potential savings were fairly low in comparison to the cost of implementing the upgrade. The limited reported potential savings from recommendations in the Score report may act as a de-motivator for some homeowners that may otherwise be interested in improving the efficiency of their home. The limited savings are due in part to Denver's low natural gas rates; lower rates can make even less-efficient equipment seem cost-effective.

PARTICIPANT FEEDBACK

Based on feedback from those who participated in the initial survey sent to participants within a week of them receiving their Score, participants felt overall generally positive regarding support the program provided. Initial survey responses indicate that 82 percent of households felt that the Score would help them save energy and 65 percent felt that the Score would help them save money.

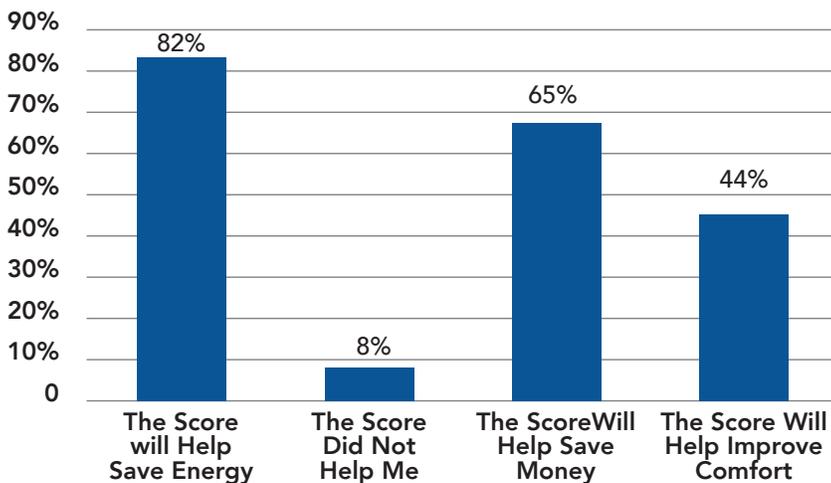


Figure 5: Benefits of the Score based on initial survey results.

Opportunities & Challenges

OPPORTUNITY: Providing a home energy label is an opportunity to start dialogue around energy efficiency and develop a trusting relationship between Denver and participating homes.

OPPORTUNITY: On average, the scoring tool estimates a five percent electricity savings and 21 percent natural gas savings potential per home if all recommendations are implemented.

OPPORTUNITY: Customizing the default Score would allow for the inclusion of local incentives and rebates.

OPPORTUNITY: Lower than national average scores in Denver highlight importance of bringing energy efficiency to residents.

OPPORTUNITY: Mandatory disclosure would increase housing data & job creation.

CHALLENGE: There is significant variation in the Score mobility of a home, and many would not improve their default Score even if recommended improvements were made.

CHALLENGE: Denver has low natural gas rates, making it difficult for natural gas saving measures to yield significant cost savings.



Next Steps for Denver Regarding Energy Labels

Overall, a Score or other home energy label program may be a useful part of the puzzle for raising awareness about energy efficiency but should not be taken as a stand-alone approach to ensuring that Denver meets its residential energy goals. While this tool could be included in a toolbox of programs that support Denver's goals, a more effective approach may be to utilize the DOE energy calculation methodology while producing a custom label that has a greater focus on local considerations, such as incentives and building codes. Building off the lessons learned and insights from this pilot, some elements to consider integrating into the City's single-family residential efforts:

- Continue to [monitor cities with disclosure policies](#) (specifically Portland, Berkeley and Minneapolis) to understand housing market impacts and energy savings as a result of the disclosure over time.
 - Explore ways that a [third-party software](#) could customize not only the layout of a Denver energy label, but what it would cost to integrate local rebates, local utility costs and options for solar or fuel switching into the estimated energy savings.
 - Include information about [efficiency opportunities outside of those tied to a home's fixed assets](#) (e.g., switching our lightbulbs for LEDs, DIY weatherstripping, etc.) in a Score report. This may result in a report that is more motivating to Denver homeowners in regard to implementing upgrades.
 - [Establish annual messaging to residents](#) on the topic of energy efficiency to initiate an energy efficiency dialogue and build trusting relationships between Denver and its constituents. Examples could include seasonal messaging about annual tune-ups or rebates the City offers so residents know where to go for resources.
 - Consider [combined messaging with water usage](#) to streamline communication rather than separate water from energy use. This could be particularly worthwhile for rental properties if average utility costs can be shared
- at the time of renting where the costs may be more important to know ahead of time (this would be similar to Minneapolis' program).
 - [Develop incentive programs](#) that specifically target the improvements that residents reported they would complete, like insulation, and for especially costly measures such as a new water heater. Additionally, incentive programs that address future efforts aimed at strategic electrification in homes may be effective.
 - [Market rebates to contractors and builders](#) renovating or building new homes to incent the installation of higher efficiency equipment and measures like insulation to combat the prevalence of inexpensive equipment that may not be as efficient.
 - [Market efficiency programs in neighborhoods with high energy burden](#); this may help to reduce energy costs for vulnerable populations and enhance community equity.
 - Seek to better understand how wrapping home energy labels into the home buying process prior to closing can [make mortgage products more accessible](#) for interested home buyers.
 - Advocate for efforts tied to [data access between the City and utility](#) to inform energy burden and high energy users for better targeting to homes that could benefit from energy improvements and energy cost savings.
 - [Improve data sharing on building permits](#) specifically tied to residential energy improvements.
 - [Engage more with real estate agents, appraisers and lenders](#) to understand how best to assign value to energy efficient home features as the basis for considering a disclosure requirement of a home energy label to hit the city's residential climate goals.
 - Investigate how a long-term policy will help to [highlight utility costs if the economy changes](#) (such as in a recession), demonstrating how homes are more affordable due to lower operating costs through energy efficient features.

The Full Report can be accessed by going to
www.Denvergov.org/HomeEnergy
or by contacting
HomeEnergy@Denvergov.org

