

Connecticut's Home Energy Score Initiative

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ABSTRACT

Endeavors have been undertaken to score and label buildings based on their energy performance. Although energy labels have been used internationally for nearly 30 years, they have had a much shorter market impression in the United States for existing residences. This research gives an update on ongoing attempts to create and supply home energy labels through the U.S. Department of Energy Home Energy Score for existing residential homes in Connecticut.

Enlisting program success on the implementation of home energy labeling poses several inquiries. Who labels the home? Is the market ready? Who keeps track of the labels? Where are the labels kept? What should customers do with them? Who foots the bill?

This paper discusses the history of home labeling in Connecticut, how the program is administered and executed by Energize Connecticut, and how Connecticut's utilities have supported market transformation for and with home energy labeling. This research offers a viewpoint that others might consider as they explore using home energy labeling in their programs and communities.

Introduction

Nutrition facts and vehicle miles-per-gallon (“MPG”) are two of the most common labels we come across in the United States to provide insight on the decisions we make when consuming food or using a vehicle. Homes, however, do not have a mainstream, common place label – yet. When policymakers and business leaders seek research on food quality or efficient vehicles on the road, the search is feasible with bounds of data to support the inquiry. If they were to pose a similar query on energy efficiency for the residential building stock, they would be met with limited or conflicting data. Energy efficiency standards, building codes, and home labeling practices vary tremendously. Whereas nutrition facts and MPG labels are clear and standardized, home energy labeling is not.

In our continued effort to curb the effects of climate change and build a society with an understanding of ecological economics, our housing stock cannot lose focus. The place where people spend most of their time, especially now with the workplace shift due to the COVID-19 pandemic, residential energy use plays a critical role in reducing greenhouse gas (“GHG”) emissions. Our residential sector in the United States accounts for 6.1% of all GHG emissions, the lowest of all sectors (EPA 2020). When considering what climate “wins” would meet national and international goals, the residential sectors is “low-hanging fruit” that would present swift positive impacts on our environment as well as the consumers pocketbook.

Change for those that influence it typically starts first with the collection of information. To instigate change in our residential house stock, we need residential energy efficiency data to be as common as it is to currently know what a Toyota Prius’ MPG is. Several countries and portions of the United States engage in regularly labeling their existing homes for energy performance. Home energy labeling for existing homes can come in many forms, where the most

common are the U.S. Department of Energy (“DOE”) Home Energy Score (“Home Energy Score”) and Residential Energy Services Network (“RESNET”) Home Energy Rating Standards (“HERS”). There are numerous other standards, including those for residential new-construction projects, such as Passive House, Leadership in Energy and Environmental Design (“LEED”), and ENERGY STAR. These standards and labels all seek to acknowledge, standardize, and enhance energy efficiency. This research will present the story of the Home Energy Score in Connecticut, a national leader in home energy labeling.

Background

In 2009, then Vice-President Biden launched a directive for the DOE to establish and launch a home labeling program as a national standard. After years of development and piloting, the Home Energy Score was publicly released in the summer of 2012. The Home Energy Score is an asset-based score based on a standard set of simplified inputs. The resulting score is between 1 and 10, where 10 is the most efficient. See Figure 1 for an example of the score output. The Home Energy Score is based on the home’s energy-related assets, where resident dependencies like behavior and electronics are excluded. The home assets that encompass the Home Energy Score include home attributes like orientation and local climate, envelope including insulation and windows, and finally equipment as in hot water and heating. See Figure 2 for a detailed view of the assets present in the Home Energy Score. Having an asset-based score creates an opportunity for standardization and accurate comparisons between homes. Operational scores are another type of



Figure 1. The DOE Home Energy Score

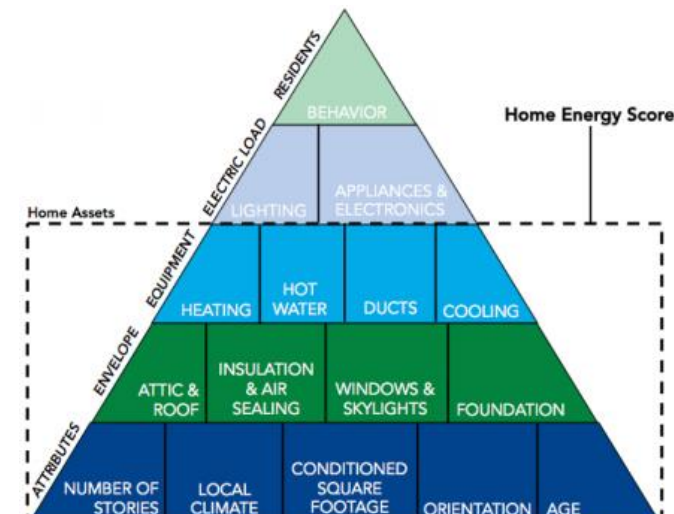


Figure 2. Home Energy Score Assets

score. These are measures based on a home’s energy consumption data (NASEO 2022). While not part of the Home Energy Score, it is important to mention this other type. The ENERGY STAR Home Energy Yardstick is one example of an operational score. The value in these scores lies in the specificity of the consumer and their unique energy use. However, when trying to standardize and compare between homes, operational scores fail to meet the measure.

When considering the Home Energy Score as the label of choice, it has three central ideals that make it the national standard – consumer education, data

aggregation, and real estate integration. At the heart of the score is the consumer and how they not only use but understand energy. The easy to absorb report provides consumers a clear breakdown of their home's assets, estimated energy consumption, and a roadmap to reduce energy use. Without being overburdened by technical information, consumers are able to digest the information and increase their energy literacy. Educated consumers can then make energy choices that support GHG reduction goals all the while reducing their personal energy burden. Data aggregation uplifts aforementioned comments on standardized data for planning and research use. With scores developed using a consistent methodology, label information can be collected and compared with ease. Furthermore, data aggregation considers the capability to target communities for incentivized deeper saving measures (e.g., insulation, windows, and heat pumps) with the additional ability to track and analyze energy efficiency gains. Treating energy information equitably, especially when it comes to real estate transactions is a critical third value. As a car salesperson is able to use MPG during the sale of a vehicle, real estate agents can use the Home Energy Score to present the valuation of efficiency features. Real estate integration also allows consumer access to unique mortgage financing products to escalate their ability to invest in energy efficiency.

The Home Energy Score transparently informs purchasers, tenants, occupants, and other stakeholders in efforts to make energy efficiency apparent and motivate markets to begin valuing building energy performance properly. Based in research, the Home Energy Score and home energy labeling is qualified to meet the mark. Focus on Energy surveyed Home Energy Score recipients in Wisconsin and found that 83 percent of respondents saw the Home Energy Score as “somewhat” or “very” clear (DOE 2022). Their research also confirmed that 75% of respondents described investment in efficiency after Home Energy Score “likely” (DOE 2022). Over 80 percent of surveyed recipients state Home Energy Score will help them save energy in their homes from The City and County of Denver, Colorado's findings in their 2019 research (Denver 2019). See Figure 3 on participant responses in the Denver survey regarding the impacts of the Home Energy Score.

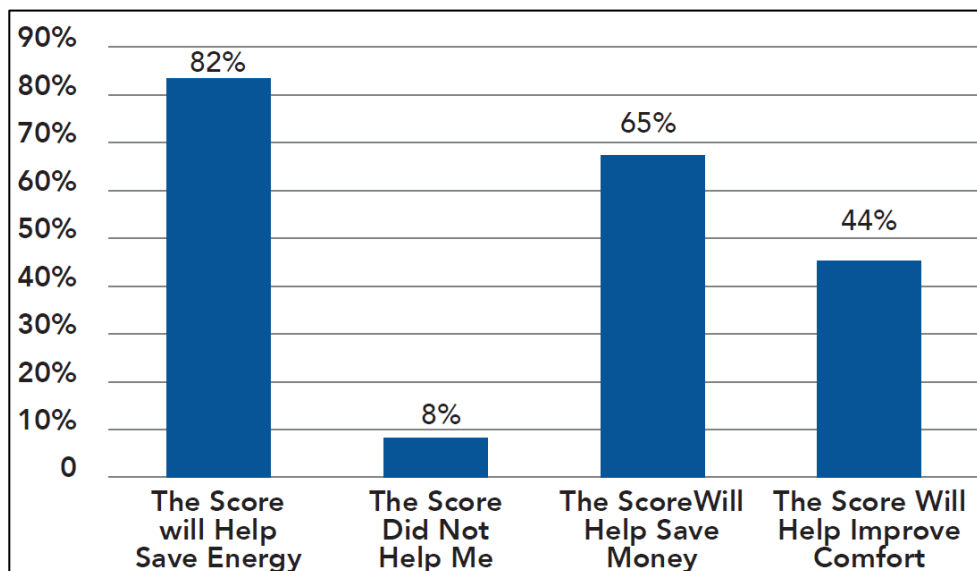


Figure 3. City and County of Denver, Colorado's Participant Responses to Survey. *Source:* Denver 2019.

The inclusion of home energy efficiency labels in real estate listings, according to a first-of-its-kind empirical study by the American Council for an Energy-Efficient Economy (“ACEEE”), would entice purchasers to choose more energy-efficient homes with lower energy bills (Sussman et al. 2020). The study presents the best evidence to date guaranteeing that home energy information supplied to buyers would impact their decisions, not just meeting their needs but also incentivizing sellers to make home efficiency

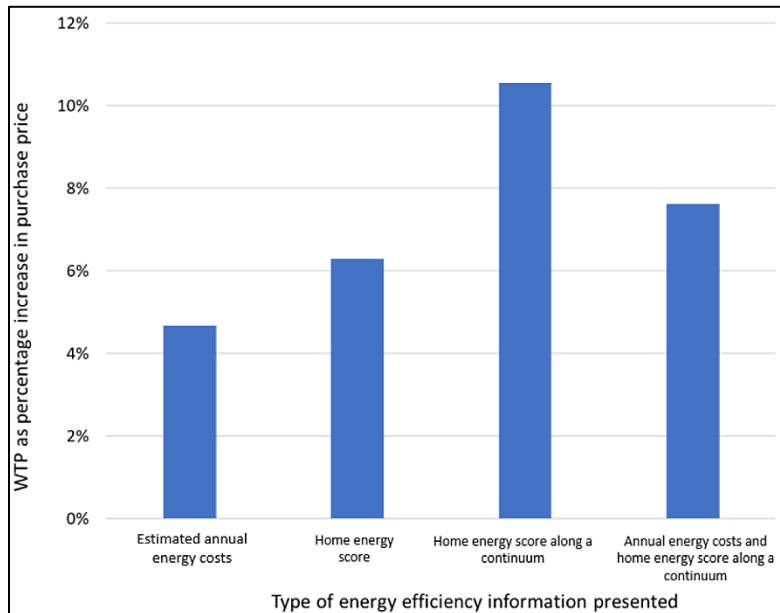


Figure 4. Willingness to Pay for Efficiency. *Source:* Sussman et al. 2020.

renovations to build more energy-efficient homes (Sussman et al. 2020). When the Home Energy Score is presented on a listing along a continuum (1-10, inefficient to efficient scale rather than a score alone), there was over 10% more willingness to pay (“WTP”), regardless of the score itself (Sussman et al. 2020). See the findings detailed from the research in Figure 4.

Evidence makes clear that home energy labeling, and by way of the Home Energy Score, consumers and markets can be equipped with the knowledge needed to secure a more climate friendly building stock. Since its launch and as of July 2022, over 190,000 Home Energy Scores were completed (DOE 2022). That is over 190,000 homes ready to meet the energy efficiency needs of today and tomorrow.

Energize CT

Created in 1998 by the Connecticut Legislature with the goals set forth in Figure 5, Energize Connecticut (“Energize CT”) is a partnership of the Connecticut Energy Efficiency Board, the Connecticut Green Bank, the State, and local electric and gas utilities. In united partnership, the shared mission is to provide Connecticut residents and businesses the resources they need to save energy and use clean energy. The Energize CT initiative empowers communities to make smart energy choices, now and in the future. The Energy Efficiency Fund, which is used to fulfil the Energize CT mission, is funded by small charges on electric and gas consumer utility bills. The Energy Efficiency Board is the fiduciary for the fund, dispersing budgets to the partnering utilities

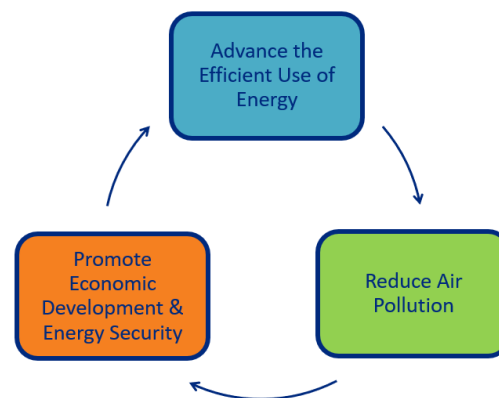


Figure 5. Energize CT Statewide Goals

(Eversource, United Illuminating, Southern Connecticut Gas, and Connecticut Natural Gas) who implement the programs.

Energize CT funds multiple initiatives, including residential and commercial weatherization, retail products, new construction, and demand response. In the recent 2022-2024 Conservation and Load Management Plan, \$708 million of collected ratepayer funds will be used to meet the priorities of equity, decarbonization, and energy affordability (DEEP 2022). Since its inception, Energize CT has been an award-winning initiative, taking first place by ACEEE in 2006 and holding top ten status ever since (ACEEE 2020). Energize CT has also secured the ENERGY STAR Partner of the Year Award for the past 5 years (Energy Star 2022). Awards won translate not only to a successful program but a deep commitment to save consumers energy and money while reducing GHG emissions. In 2021, combined residential, commercial, and industrial program savings include (EEB 2021):

- | | |
|----------------------------------|-----------------------------------|
| • Annual Savings | • Lifetime Savings |
| ◦ \$30.3 million | ◦ \$356.3 million |
| ◦ 80,351 tons of CO ₂ | ◦ 943,510 tons of CO ₂ |
| ◦ 187.5 million kWh | ◦ 2.2 billion kWh |
| ◦ 2.3 million CCF | ◦ 26.1 million CCF |

Connecticut was one of the first states to establish and implement residential labeling schemes, mostly in response to the federal effort. Connecticut's labeling energies come from legislation passed in 2011 that established the Department of Energy and Environmental Protection (“CT DEEP”) and mandated that 80 percent of homes be weatherized by 2030. In 2013, CT DEEP announced a ruling that ordered utilities add labeling into the statewide residential weatherization program, following a voluntary labeling experiment. The Home Energy Score was chosen as Connecticut's state energy label, as it was already being distributed through home performance contractors. There are over 100 certified assessors in Connecticut as of July 2022, and over 53,000 scores have been completed, the most of any Home Energy Score partner.

As over a dozen states and municipalities in the United States have forced energy disclosure and benchmarking for commercial and multifamily buildings, obligatory disclosure in the single-family sector is significantly less prevalent. Despite attempts to implement residential disclosure requirements, the real estate and lending communities have effectively built campaigns highlighting fears that inefficient homes will be undervalued if the market is made aware of the cost to maintain them.

Due to early pushback from realtors and lenders, Connecticut has adopted a voluntary approach to home labeling, trying to capitalize labels onto existing energy efficiency initiatives to introduce customers to the label and populate the market with Home Energy Scores. Energy labels display a home's initial Home Energy Score at the time of an energy assessment, as well as an updated “final” Home Energy Score if the proposed deeper saving measures are installed to reflect the energy upgrades’ effects. Connecticut hopes to make the argument that energy labels will enable markets to operate better by increasing energy transparency, allowing people who invest in more energy efficient homes with a greater return on their investment.

Home Energy Labeling Information Exchange (HELIX)

What should Connecticut do now that it has these scores and is continuing to create more? What are the benefits of these ratings for homebuyers and renters? From 2013 to 2018, the Home Energy Score was offered to customer on an opt-out basis without any ability for the collected Home Energy Scores to be shared with anyone but the DOE. Directed by CT DEEP, in 2018, the Home Energy Score turned into an opt-in process and customer release wording was revised to allow third parties to obtain the Home Energy Scores, such as Multiple Listing Services (“MLS”). The lack of a mechanism in place to communicate energy information directly from sellers seeking to promote properties to the real estate listing purchasers use to compare them is the biggest obstacle to universal access to energy information for homes on the market. A database that holds residential energy data was the final piece of the jigsaw.

With the support of the Northeast Energy Efficiency Partnerships (“NEEP”), this link is made possible thanks to the Home Energy Labeling Information eXchange, or HELIX. HELIX is a DOE-funded project that aims to create a database that can automatically populate real estate listings with home energy information from the Home Energy Score and other sources as it becomes available. HELIX's mission is to break down the barriers to energy information for new homes on the market. HELIX acts as a repository for DOE Home Energy Score data and a conduit for integrating into local MLS while maintaining adequate data security and privacy measures.

HELIX makes home energy data available to the local MLS and other market participants (such as appraisers, lenders, and energy code inspectors). While HELIX is focused on the Northeast, it aspires to be a reproducible, open-source concept that may be used across the country. To create a usable and successful product, the project involves trainings for real estate professionals as well as ongoing engagement with real estate market players.

Collecting home energy ratings and preserving domestic energy data in the HELIX database raises awareness of and demand for energy-efficient home investments. When a home gets an energy score or label, the higher market value of that home causes it to sell faster. It's comparable to when a consumer is purchasing a car and you know the MPG – this knowledge does not necessarily have to impact their choice to buy the car, but it does help them comprehend what will happen with regard to energy use as a result of their decision. Purchasing a house is an emotional investment, and the Home Energy Score will positively offer homeowners with a greater knowledge of what goes on "beyond the walls."

As homeowners, purchasers, and renters have a greater awareness of energy statistics and prices, they will be better prepared to deal with shifting seasons and varying temperatures.

Statewide initiatives like Energize CT's Home Energy Solutions program are important steps toward lowering energy costs for New England households and allowing building owners to market their energy efficiency upgrades. Incorporating HELIX into this program results in the creation of a repository that will allow the sharing of energy data created by efficiency measures to be used in the real estate market, proving to be effective in pushing energy efficiency. Figure 6 shows the supply and demand market drivers for the Home Energy Score.

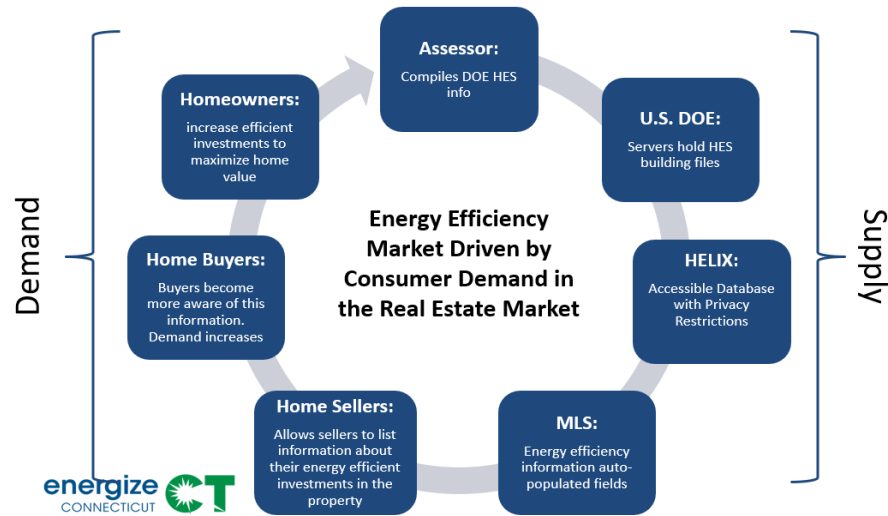


Figure 6. Energy Efficiency Market Driven by Consumer Demand in the Real Estate Market

Home Energy Solutions

Home Energy Solutions (“HES”) is an award-winning residential energy efficiency program offered through Energize CT available to help customers save money and energy while increasing comfort in their home. HES provides an in-depth home performance assessment and service that saves the average customer around \$200 each year in energy bills and can reduce their energy costs even further if they take advantage of additional deeper saving measure opportunities like insulation, triple pane windows, and heat pumps. HES services are offered at a low \$50 customer copay. The work completed during the visit would cost an average of \$1,000. See Figure 7 for a breakdown on the services provided during the HES assessment and the benefits received by customers.



Figure 7. Home Energy Solutions Services and Benefits

Each lead technician that provides HES services is also a certified Home Energy Score Assessor. With a workforce of over 100 Home Energy Score Assessors, customers that seek HES weatherization services, are able to receive the Home Energy Score during the same visit at no cost. The HES customer report that details what was rendered in the customers home in addition to the deeper saving recommendations is coupled with the Home Energy Score report. At the conclusion of the HES assessment, the lead technician will review in detail the savings as part of the visit, the Home Energy Score, and the roadmap to increase their score. Energize CT offers numerous rebates for customer to achieve the recommended measures as motivators to take their HES assessment and energy efficiency journey further.

The Home Energy Score has its own platform through DOE for the scores to be entered and reports to be generated. Given that HES technicians are providing services in customer homes and time efficiency is a key feature for HES contractors and their technicians, the utilities designed a mobile tool for data entry. The mobile tool includes all information required for the HES assessment, in addition to the Home Energy Score. Using an application programming interface (“API”) with the DOE Home Energy Score portal, technicians can enter applicable data, send to the DOE, and receive a completed report to provide customers. Having a mobile tool ensures data integrity and efficiency, creating a frictionless process for Home Energy Scores to be collected. The utilities are presently working through an updated mobile platform that will allow Home Energy Scores to be generated for Income Eligible customers and customers that are seeking only a Home Energy Score without HES services. Figure 8 provides an example of the existing HES mobile tool.

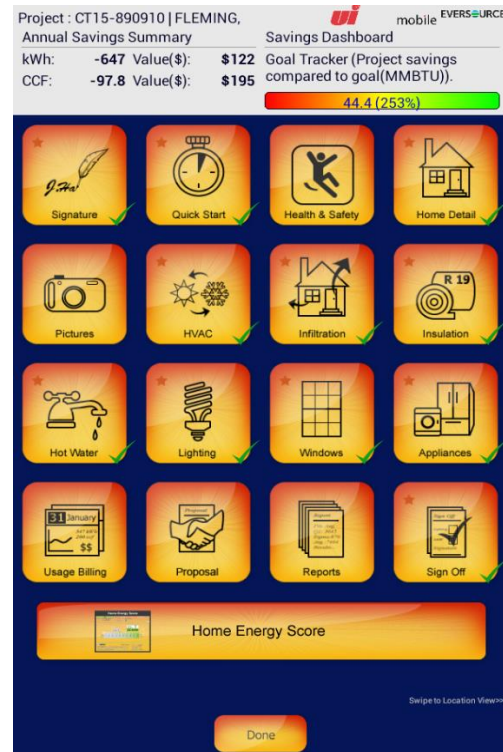


Figure 8. Home Energy Solutions Mobile Tool

Home Energy Score Offering Redesign

During the 2013-2018 period when the Home Energy Score was an opt-out offering, there was a significant opportunity for a high volume of Home Energy Scores. When the opt-in and MLS language was added to the Home Energy Score customer release in 2018, the utilities saw a major drop in customer participation due to fears of how a low score may affect the value and potential sale of their home. Even with technician and realtor training on how to explain the Home Energy Score as well as commitment from CT DEEP, little moved the number of Home Energy Score in CT. The nature of the HES program and the free offering of Home Energy Scores during the assessment kept Energize CT as a national leader in Home Energy Scores, though success was still limited.

In 2021, with direction by CT DEEP, the utilities looked to augment the Home Energy Score to overcome the barriers succumb to for nearly a decade. The first step was to put together an active working group to process through what redesign would look like. The working group included perspectives from CT policymakers, consultants, HES contractors, HES technicians, HES inspectors, CT realtors, DOE Home Energy Score program team members, and utility representatives. With regular meetings in 2021, the working group came up with several core changes to enhance the Home Energy Score offering:

- Revise and soften the Home Energy Score release language
- Provide technicians a script and Q&A sheet
- Scale metrics for HES contractors and utilities
- Offer a Final Home Energy Score to customers after deeper saving measures are installed
- Redesign the HES customer report to combine the Home Energy Score report

The information and plans created through the working group set the Home Energy Score up for tremendous success. The first step was to revise the Home Energy Score release language to remove all mention of the MLS and sale of a home. The partnership is between the utilities, HELIX, and the DOE. As CT works to integrate the MLS fully with HELIX, it was appropriate to only make mention of the relationships that exist. It was also made relevant during the working group that the ultimate decision to include the Home Energy Score on an MLS listing is up to the seller and their relator. By changing the language, the focus is on the Home Energy Score itself and the secure transfer to data collection databases. Since technicians were used to referencing an aged release for years, the working group created a clear and effective script for technicians to learn the updated way to speak about the Home Energy Score. The working group supplemented the script with a Q&A document for customers that want to dig deeper into what the Home Energy Score is. To ensure the entire technician and HES contractor community understood and accepted the changes, the utilities provided in-depth training on the revisions and how to communicate the Home Energy Score in a way that put more focus on energy efficiency and less on the real estate transaction.

The next step was to push the Home Energy Score from just offering a Home Energy Score to offering both an initial Home Energy Score at the time of the HES assessment and a Final Home Energy Score after recommended deeper saving energy efficiency upgrades are completed. The goal of HES is for a customer's energy efficiency journey not to end at the in-home weatherization assessment and service. The Final Home Energy Score would be used as a tool to increase the number of customers that install deeper saving measures like insulation, windows, and HVAC equipment. With the goal of a higher Home Energy Score and a convenient pathway designed for customers during the time of the HES assessment, Final Home Energy Scores are now offered to customers free of charge in one of two ways.

Customers can opt-in to receive a free Final Home Energy Score within two years of their initial Home Energy Score either virtually the first year by their HES contractor or in-person anytime and during the second year only by a utility inspector. Marketing to customers will come in six-, nine-, and eighteen-month intervals. Customers will be marketed to install the recommended measures and receive a free Final Home Energy Score when they are ready. An important outcome from the working group on this was the ease of performing virtual Final

Home Energy Scores. With much review, it was decided that the utilities will compile all rebate data from the customer and provide an easy-to-use report through their respective tracking systems for HES contractors to use in the DOE Home Energy Score portal. As no other Home Energy Score partner is seeking to perform Final Home Energy Scores in this manner or scale, the teams were designing this methodology from scratch. With the support of DOE Home Energy Score program team members, it was decided that a Final Home Energy Score could be performed by any HES contractor employee without being a Home Energy Score Assessor. This provided a convenient opportunity for office and assistant technicians to perform Final Home Energy Scores virtually. To accommodate this unique process, the DOE team designed a new Assessor ID and login for HES contractors to use for Final Home Energy Scores. The full-scale launch of Final Home Energy Scores was initiated in June of 2022.

Making certain that HES contractors and their technicians did not fall back to the previous pitfalls of communicating the Home Energy Score, the utilities, with guidance of the working group, set a required metric for all to adhere to. Using historic data and a lifted goal, the utilities set a required 40% goal of all homes that have HES receive a Home Energy Score. All HES contractors are bound by a Vendor Scorecard that measures their programmatic success. Those that do not meet the obligations of their inspections, savings, and compliance metrics may be suspended or terminated. The utilities added the Home Energy Score 40% metric in September of 2021 as part of the compliance section to ensure HES contractors place consistent value on the importance of offering the Home Energy Score. Once the metric was set, the utilities saw a major increase in Home Energy Scores and positive HES contractor reception. Figures 9 and 10 detail the history of Home Energy Scores collected as part of Energize CT.

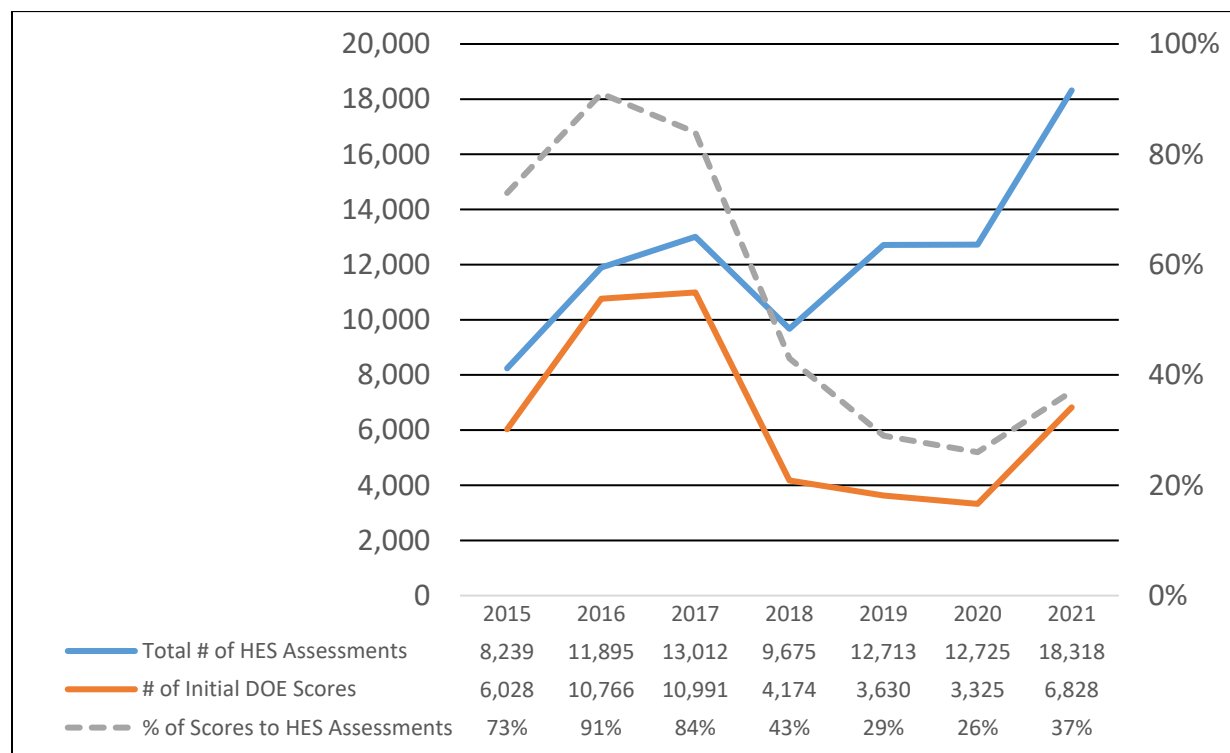


Figure 9. Home Energy Score Adoption

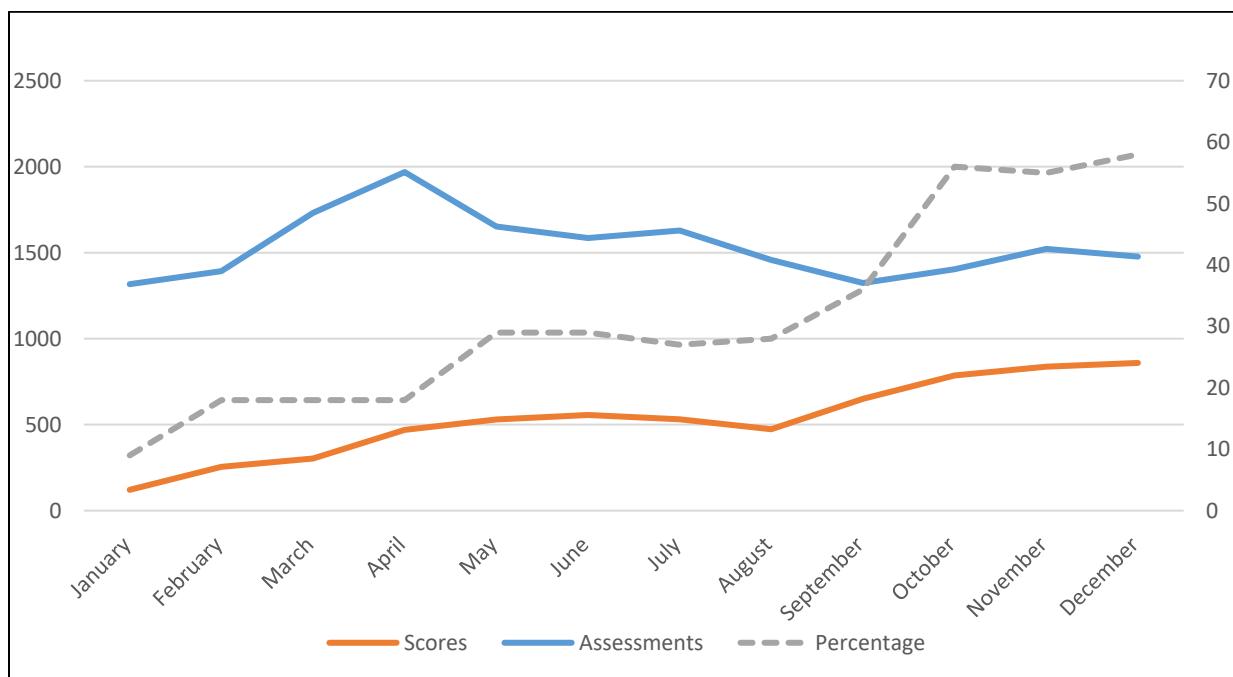


Figure 10. Home Energy Score Adoption – Monthly in 2021

The final feature of the redesign set by the working group is to combine the HES customer report and the Home Energy Score report. With the aforementioned tasks taking focus, work has not yet started with the new report. The working group will look to reconvene in 2023 and begin planning the report redesign.

Conclusions

The Home Energy Score in Connecticut evolved as did all of Energize CT. Becoming the first state in the nation to coordinate home energy labeling through the Home Energy Score set the pace for success. Partnerships with the DOE, the State, HES contractors, and NEEP is how the strength of the Home Energy Score today in Connecticut was made possible. Strong policy leadership to require home energy labeling, as part of weatherization services, sets the benchmark to learn what is possible. By way of initial policymaking, Connecticut has been able to secure a significant set of home energy labels to understand its housing stock and what improvements are needed for GHG reduction and meeting climate goals. Having a clearly defined channel to provide home energy labels is also a significant proponent to success in CT. Without the Home Energy Solutions program, attaining the over 50,000 Home Energy Scores may not have been possible.

Communities, states, and regions that seek to inform their process on how to deliver home energy labels, consider the first step may not be home energy labels, but energy efficiency services. Homeowners and renters consistently seek out ways to make their homes more comfortable while saving money. Reducing energy through weatherization and deeper efficiency measures are a channel to do so. Home energy labeling should provide a clearly prescribed pathway to meet energy efficiency needs where consumers are able to increase their energy

literacy. As home energy labels grow in scale, it is continually important to evaluate and share successes to design programs that can accommodate energy labels for all homes in the nation.

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