

Score! How Utility Energy Efficiency Programs Are Benefiting from City Energy Labeling Requirements

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ABSTRACT

An increasing number of local governments across the United States are instituting mandatory residential energy labeling requirements when a home is listed for sale. As these residential energy labeling policies are implemented, they create opportunities for local energy efficiency (EE) programs to more effectively identify EE opportunities and improve engagement with homeowners. Local home energy labeling policies, like those in Minneapolis, Minnesota, and Portland, Oregon, produce large data sets with detailed EE information on thousands of homes in those communities. The availability of these new datasets allows utility-sponsored EE programs to better understand where EE potential exists and can inform creative approaches that motivate homeowners to invest in new EE features. Local EE programs are now able to:

1. analyze comprehensive home energy datasets produced by local labeling policies;
2. integrate insights taken from these datasets into program design and marketing strategies;
3. identify opportunities to address underserved communities; and
4. develop targeted customer interventions and personalized program services.

In Minneapolis, the City and CenterPoint Energy developed an Energy Advisor service that identifies recent homebuyers who are most likely to make home energy improvements and provides support for them to complete these projects. In Portland, the City provided Energy Trust of Oregon access to the results of the first 24 months of energy scoring data, yielding analytical insights that resulted in new targeted customer acquisition strategies. The strategies and outcomes derived from these efforts will be outlined in this paper.

Introduction

A growing number of locations in the United States regularly provide energy information on existing residential buildings to support utility EE programs or to ensure transparency to buyers and renters as part of real estate transactions. Energy labels offer a form of consumer protection for both buyers and renters, can quantify investments made in a building's EE and renewable energy systems, and encourage sellers and property owners to invest in efficiency improvements. Energy labels are an important step toward making EE visible, enabling markets to begin to truly value building energy performance, and allowing EE upgrades to be appropriately and equally valued against other home improvements. A recent study completed in

Austin, Texas, on the City's Energy Conservation Audit and Disclosure (ECAD) ordinance, found that the disclosure policy has created premiums for efficient homes and that ECAD leads to higher participation in EE programs (Meyers 2019). This policy has been in effect for more than 10 years, providing enough time for its initial impact to be documented and understood.

Energy disclosure policies create a unique opportunity to collect energy information on the local housing stock and deliver energy improvement recommendations to new homebuyers. This is a motivated audience that typically spends an additional \$4,100 on home improvement projects in the first year of ownership compared to the annual spending of existing homeowners (Siniavskaia 2017). Given this highly motivated audience, the information and resources needed to complete energy upgrades creates a significant market opportunity for spurring investment in home energy improvements.

Thanks to these outcomes, local governments are increasingly interested in considering policies that require the disclosure of home energy labeling information as part of most residential real estate transactions. Residential energy labeling requirements triggered by a real estate transaction now generate thousands of home energy assessments each year, creating robust and actionable datasets for local utility programs to access and use in their EE savings acquisition strategies. This paper reviews local government policies in Minneapolis, Minnesota, and Portland, Oregon, that require disclosure of energy labels as part of a real estate transaction and examines how those policies are informing and impacting local EE program delivery.

Minneapolis Case Study

Policy Background

The City of Minneapolis' Climate Action Plan (City of Minneapolis 2013) outlined strategies for achieving established residential carbon reduction goals. Among these strategies was creating a time-of-sale (time-of-listing) and time-of-rent energy disclosure policy. This concept was championed by City Council Members Cam Gordon and Jeremy Schroeder, with support from the City's Sustainability Division and Construction Code Services office. After nearly a year of stakeholder engagement and policy development, the Minneapolis City Council approved the policy in February 2019.

The goal of this policy is to spur investment in cost-effective energy improvements. These investments will help the City reach their goals for reducing greenhouse gas emissions while improving the existing housing stock. The majority of Minneapolis single-family and duplex homes were built before 1940, and more than 94% were built before the energy code went into effect in 1980. Given the age of the housing stock, it was important to design the disclosure policy with a goal of improving older existing homes. This design goal is reflected in the City's implementation strategy, which is outlined in more detail below.

Partners

The City of Minneapolis worked closely with the Center for Energy and Environment (CEE) on the development of their policy. CEE completed extensive research on time-of-sale energy disclosure, with grant funding from the McKnight and Carolyn Foundations, and developed a report with recommendations for effective implementation (Nelson 2017). Additionally, the City, CenterPoint Energy, and CEE conducted a small pilot to test the feasibility of adding an energy report and score to time-of-sale inspections that were already

occurring in the market (Smith 2018). The results of the pilot indicated that this would be a successful approach, and CEE recommended that the City add energy disclosure to their Truth in Sale of Housing (TISH) program.

Energy Score

The energy score used in the City of Minneapolis time-of-listing energy disclosure policy focuses on the following four areas with the highest energy savings potential for existing homes in cold climates: (1) attic insulation and air-sealing; (2) wall insulation; (3) heating systems; and (4) single-pane windows. The goal of this scoring system is to motivate homeowners to complete these upgrades and help them prioritize projects by outlining the energy savings opportunity for each. Homes are scored on a 0–100 scale, and the program is designed so every home can reach a score of 100 by completing recommended cost-effective projects.

Homeowners can use the scoring system to identify the next best project based on how many points their overall score will improve by once it has been completed. The “improvement points” represent the energy savings potential associated with project completion. This simplifies the decision-making process for the homeowner and eliminates the need to use energy nomenclature like therms and kilowatts that homeowners may not understand. This scoring system has also been used in CenterPoint Energy’s and Xcel Energy’s Home Energy Squad audit program since 2012 and has proven to be an effective tool for energy auditors.

Assessment Process

The assessment for Minneapolis’ time-of-listing energy disclosure policy was incorporated into the City’s TISH program, which requires an evaluation before the home is listed for sale. Before this policy was adopted, TISH evaluations primarily focused on the disclosure of key health and safety aspects of the home. Integrating energy data collection into this process helped alleviate some stakeholder concerns, as the incremental cost was minor compared to a new, separate energy data collection process. This also allowed the City to leverage third-party TISH evaluators and compliance processes that were already in place.

It was also important to limit the number of data points to only those needed to deliver useful energy improvement recommendations. Fewer data points helped keep the cost of the evaluation low and reduced the training needs for the TISH evaluators. The following list is the data needed to generate the energy disclosure report, score, and cost-effective recommendations:

- Attic insulation: attic area, insulation type, and number of inches
- Wall insulation: 2” hole drilled to verify insulation type and number of inches
- Heating system: fuel, system type, venting, and age (more or less than 20 years old)
- Windows: number of single-pane windows

Energy Improvement Recommendations

Recommendations for improving the EE of the home are generated from the data collected during the assessment. These recommendations also align with local utility programs, so if a homeowner receives a recommendation, they also qualify for a rebate. For example, homeowners are eligible for a \$500 attic insulation rebate from CenterPoint Energy if attic insulation levels are below R-30. Attic insulation is therefore recommended in the energy disclosure report if the home’s attic insulation is rated below R-30. Recommendations are also

prioritized based on the energy savings potential for the homeowner, which is determined when the energy score is generated. This creates a roadmap for the homeowner, helping them understand which recommendation to complete first. In addition to energy savings, heating system recommendations consider the age of the system. The goal with this recommendation is to inform and incentivize homeowners to be proactive, so they can avoid having to suddenly replace an old system if it fails in the middle of winter. Instead, they are encouraged to install an energy efficient heating system now.

Cost and Funding

Minneapolis did not need to hire additional staff for this policy because it was incorporated into the City's existing TISH program. Staff time was needed to launch this effort, as City staff and CEE developed training materials for TISH evaluators and completed software updates to generate the energy disclosure report. Once the program became fully operational, no additional staff time was needed.

In addition to the TISH program, the City hired CEE to educate realtors on the policy and energy disclosure report, create consumer awareness campaigns, and perform desk and on-site quality assurance of the TISH energy data. CenterPoint Energy also provided funding to pilot the energy advisor service. These efforts help ensure that the policy is as effective as possible and are discussed in more detail below. The City's Sustainability Division funds these activities with money from a recent Minneapolis utility franchise fee increase, which also funds other energy and climate programs.

Minneapolis Policy

Minneapolis's time-of-listing energy disclosure policy passed unanimously in the City Council in February 2019, and implementation began on January 15, 2020. This policy requires the Energy Disclosure Report, which includes the energy score, to be displayed at all open houses and reviewed at the closing of the home. The report includes recommendations for how to improve the score, estimated cost and savings for these recommendations, access to low-interest loans, and technical support from home energy advisors.

Portland Case Study

The City of Portland has engaged in climate action planning since the 1990s. Portland and Multnomah County have committed to reducing local carbon emissions by 80% below 1990 levels by 2050, with an interim goal of a 40% reduction by 2030. About 20% of carbon emissions produced locally are attributable to powering homes. Portland's existing housing stock is largely dominated by single-family homes. As in Minneapolis, many of these homes were constructed early in the 20th century prior to the introduction of more prescriptive building codes. Portland's mandatory time-of-listing EE labeling policy builds upon previous positive experience with voluntary home EE labeling in Oregon that had reached only a small percentage of the housing stock. The policy both provides increased market transparency for consumers at a critical decision and investment point and offers a roadmap for homeowners to pursue potential retrofit options in their new home.

The City of Portland pursued the mandatory Home Energy Score policy initiative in 2016 to meet goals in its climate action plan. The City recognized that it could not achieve its carbon

reduction targets without significant acceleration in EE and renewable energy activity in the residential sector. Based on prior local program experience, Portland deemed mandatory home energy scores an effective means of conveying helpful information to homebuyers and sellers, as well as to other real estate industry stakeholders like appraisers and lenders. Portland's mayor at the time, Charlie Hales, became a proponent for the Home Energy Score policy and championed it with city council members, with staff support from the Bureau of Planning and Sustainability. The presence of statewide energy labeling standards overseen by the Oregon Department of Energy provided assurance to the Portland City Council that all energy-labeling activity within the city would be part of a broader system that was designed to support the integrity of home energy assessments across the state.

Portland's Home Energy Score™ (HES) program was launched on January 1, 2018, after 10 months of program development. In the first 30 months of HES implementation, more than 19,000 Portland homes received an energy score. These scores were disclosed to homebuyers in real estate listings, made possible through a partnership between the City of Portland's implementation partner Earth Advantage and the Regional Multiple Listing Service (RMLS). The robust and ever-growing dataset describing the current condition of Portland homes provided local stakeholders like Energy Trust of Oregon (Energy Trust), a local utility-sponsored EE organization, with customer insights and energy savings acquisition opportunities. The City of Portland and Energy Trust have been collaborating to raise awareness of how the HES process can be used in tandem with Energy Trust programs and how Energy Trust's trade ally network can effectively deliver HES-influenced home improvements.

Partners

The City of Portland collaborates with Portland-based nonprofit organization Earth Advantage to provide technical support and fulfill many of the required U.S. Department of Energy (DOE) Home Energy Score Partner functions. Earth Advantage oversees: (1) Home Energy Assessor recruitment, onboarding, training, and maintenance of the authorized assessors list; (2) quality assurance of Home Energy Assessors via in-field inspections and automated review of assessors' data inputs through the Green Building Registry™; and (3) Green Building Registry's publicly accessible database, localized Home Energy Report generator, and direct conduit to the local multiple listing service. Earth Advantage provides HES data to Energy Trust and other stakeholders semi-annually; Energy Trust then analyzes and integrates this data into their residential program planning and delivery processes. This initiative also provides an opportunity for the City of Portland and Energy Trust to work together to provide recent homebuyers with assistance and resources to make efficiency upgrades that will improve their new home.

Energy Score

Portland selected the Home Energy Score as the basis of the City's labeling requirement. Created by the U.S. Department of Energy and partnering laboratories, the Home Energy Score is a standard rating system that estimates a home's energy use based on its envelope, energy systems, and square footage. The home's estimated energy use is then converted into a score on a 10-point scale, where a score of 1 represents a home with high energy use, a score of 5 represents a home with average energy use, and a score of 10 represents a home with low energy use. The Home Energy Score is normalized for differences in weather patterns and city-specific average

energy use, ensuring that a home scoring a 5 in Portland is expected to perform comparably to an average home elsewhere in the United States in terms of energy use. Portland selected the Home Energy Score because it's relatively easy and affordable, it's aligned with national mortgage and home improvement financing products, and it was approved by the Oregon Department of Energy for use throughout the state.

Assessment Process

Portland's pool of private market assessors is authorized by the State of Oregon to assess each home on-site and enter data into the DOE online Home Energy Scoring Tool. These data points include details on the building envelope (roof, foundation, walls, insulation, windows), energy systems (heating, cooling, hot water), and floor area. The program does not require blower door testing, duct testing, or infrared imaging, but home sellers can request these additional services from their assessor if they desire. Likewise, drilling to verify wall insulation is not required. Assessors are instead coached on noninvasive tactics for determining if wall insulation is present.

Energy Improvement Recommendations

The Portland HES label provides two main categories of recommendations: (1) "Priority Energy Improvements" with a 10-year payback or less are generated by the DOE HES system. The exact language and specifications of these recommendations were customized through the Green Building Registry to mirror Energy Trust program incentives as closely as possible. (2) "Additional Energy Improvements" take longer than 10 years to make a return on investment but can have a significant impact on the comfort, efficiency, and environmental impact of the home. The recommendations are generated through logic built into the Green Building Registry. This recommendations section was customized for the Portland market in recognition that some measures, like wall insulation in gas-heated homes, have a major impact on EE and should be encouraged even if the measure's payback is greater than the 10-year threshold. Not all improvement recommendations provided on the Portland Home Energy Score Report are supported by Energy Trust program incentives.

Cost and Funding

The City of Portland staffs approximately one full-time employee for HES program implementation. The Bureau of Planning and Sustainability spent approximately \$60,000 on outside contracts during policy and program development, with this investment decreasing during the first two years of policy implementation. Beyond initial start-up grant funds provided by the City of Portland and Energy Trust, a majority of Earth Advantage's staff time and costs related to technology and quality assurance services are addressed through a market-driven fee of \$25 per score for all City of Portland Home Energy Scores generated by authorized assessors. Due to the impacts of COVID-19, BPS is considering alternative staffing options including shifting more program implementation responsibilities to third-party entities.

Portland Policy Compliance

City staff began monitoring compliance with the requirements of the ordinance when the program was launched in 2018. Compliance checks involved randomly selecting and reviewing

10% of new listings using several of the major online real estate listing platforms including HomeSnap, Zillow, Redfin, and Realtor.com. To be fully in compliance, a home sale listing must include both the Home Energy Score and hyperlink to the custom Home Energy Report on the Green Building Registry.

During the first year of implementation, City staff contacted home sellers and listing agents when a home was observed to be out of compliance. They were provided with instructions on how to comply, including the steps for obtaining a Home Energy Score. BPS sent home sellers letters using postal contact information from Multnomah County tax assessor records, which are publicly available on www.portlandmaps.com. During the first year, the RMLS listing site often included a listing agent’s email address, and staff also sent an additional courtesy notification to the listing agent. Compliance efforts focused primarily on educating the real estate market about the requirements to allow the market time to adjust. In 2019, program staff received feedback from program partners and the real estate professionals that education and outreach had reached maximum effectiveness and that additional enforcement would be needed to improve compliance with the requirements. Starting in July of 2019, staff updated compliance notifications to reference penalties for noncompliance including issuing fines to home sellers 90 days after an initial warning notice. Compliance rates began to increase further, but enforcement of the policy was subsequently temporarily suspended in March 2020 due to the COVID-19 pandemic.

Table 1. Portland Policy Compliance

Policy Compliance		
	2018	2019
All eligible Portland home listings ¹	13,761	13,282
Estimated compliance rate	52%	60%

How Both Cities Are Benefitting

Informing Existing and New Utility Programs

Minneapolis, MN. Energy disclosure provides an abundance of data at a scale rarely achieved by voluntary, in-home utility programs. This data is also public, which allows the City and utility more flexibility in how it can be used. In Minneapolis, the newly adopted policy will provide the City and CenterPoint Energy with 5–10 times more data on the local housing stock, compared to the voluntary in-home energy audit program. This creates an unprecedented opportunity for Minneapolis and CenterPoint Energy to leverage this data to help target EE resources and

¹ Estimated to exclude listings that are not subject to the ordinance

materials to those that need it, which will help both entities achieve their energy savings and climate goals.

Additionally, Minneapolis and CenterPoint Energy are working with CEE to pilot an energy advisor service for new homeowners. This builds off previous work by CenterPoint Energy and CEE that found that homeowners need guidance when completing energy projects and that providing an energy advisor service greatly increases the conversion rate for competing energy projects that are recommended during an energy audit (Mark 2016). The goal of this service is to increase participation in CenterPoint Energy's EE programs, reduce overall EE program costs, and increase the volume of EE upgrades completed. The pilot offering provides:

- Knowledgeable staff to answer homeowner questions about:
 - the energy disclosure report
 - energy improvement recommendations (benefits, cost, and operations/maintenance)
 - CenterPoint Energy rebates and programs
 - insulation and HVAC contractor contact information and quality assurance
 - available financing
- A streamlined process for completing energy upgrades:
 - collect homeowner contact information for customized follow-up
 - schedule insulation and HVAC bids with qualified contractors
 - schedule insulation and HVAC work with contractors
- Information on utility programs to a highly motivated audience
 - mailers and emails that can be customized based on data collected at the time of sale

To engage homeowners in this service, energy advisors and the resources they provide are highlighted on the energy disclosure report. This service also keeps the next step simple: Call an energy advisor. This simplicity can help remove barriers for homeowners. Rather than referring homeowners to a long list of contractors and telling them to get three bids, which can often be overwhelming and result in more questions than answers, they can contact an energy advisor to assist them through the process. This simplifies the process for homeowners and provides an unbiased third party to assist homeowners through the upgrade process.

Portland, OR. The City of Portland and Energy Trust are leveraging the extensive, continually expanding set of HES data to engage new homeowners in retrofit activities specific to their home that yield energy savings, carbon reductions, and customer cost savings. From a marketing perspective, this initiative provides an opportunity to tailor messaging specifically to recent homebuyers of HES homes and connect them with assistance and resources for EE upgrades that will improve those homes. The data also creates an opportunity to identify zip codes with large concentrations of similar technologies for targeted marketing, even to homeowners without an HES.

The City of Portland and Energy Trust are working together to develop a co-branded direct mail campaign targeting homes that received recommendations for insulation, ductless heat pumps, and heat pump water heaters during their HES assessments. The co-branded direct mail will focus on the benefits that these measures can provide and the Energy Trust incentives that are available. Energy Trust is also planning to implement an integrated marketing approach that leverages social media, web content, and public relations activity to explicitly raise

awareness about HES and related incentive opportunities, as well as to more subtly weave messaging about HES into standard marketing activities targeting Portland customers. All marketing tactics will direct customers to a central landing page that highlights the three key opportunities for improvement. Energy Trust will also align these efforts with best practices for content marketing by including tags in social media. Full implementation of these efforts is currently on hold due to the COVID-19 pandemic.

Data from Assessments

In Minneapolis, data collected on a home through the energy disclosure policy is used to generate recommendations that align with CenterPoint Energy’s EE programs. The following table presents a summary of the recommendation data.

Table 2. Minneapolis Recommendation Data

Area	Percentage Recommended	CenterPoint Energy Incentive
Attic Insulation	69%	\$500
Wall Insulation	27%	\$500
Heating System	43%	\$400
Storm Windows	8%	n/a

Additionally, this data can be overlaid with census and location information. The following figure illustrates a map of the number of homes scored and average energy score by zip code.

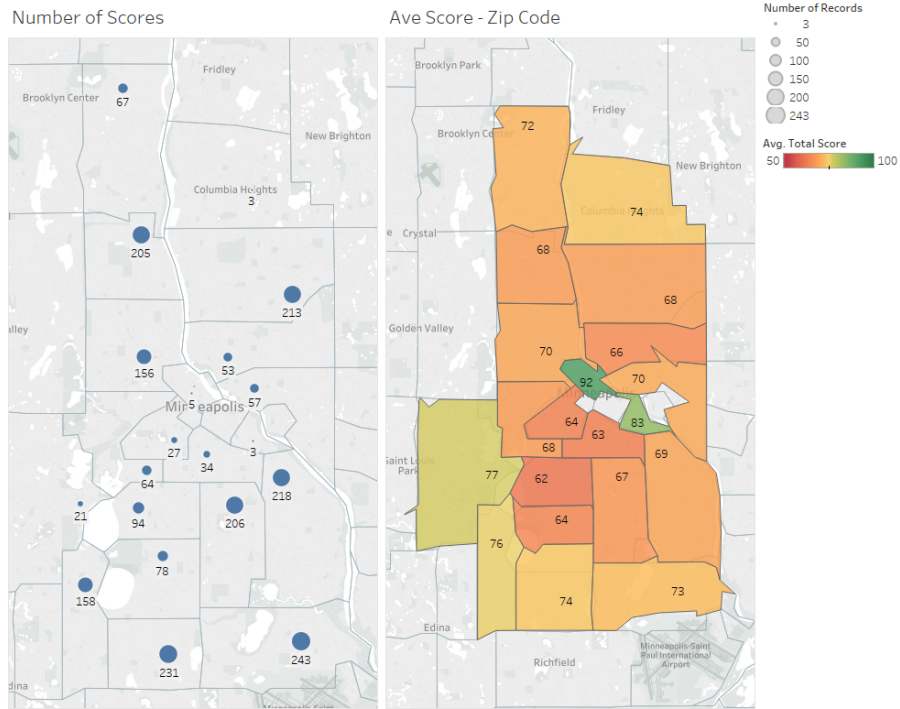


Figure 1. Number of homes sold by zip code in Minneapolis (left). Average energy score for each zip code in Minneapolis (right). *Source:* City of Minneapolis.

In Portland, Energy Trust analyzed HES data to determine the following efficiency upgrades to promote through marketing campaigns. Energy Trust and the City of Portland will work together to track the volume of measure activity taking place after homes receive a score.

Table 3. Portland Recommendation Data vs. Incentive Offering

Area	Percentage Recommended	Energy Trust Incentive
Attic Insulation	35%	\$0.25–\$0.50 per sq. ft.
Wall Insulation	42%	\$0.30–\$0.50 per sq. ft.
Heating/Cooling System	48%	\$250–\$1000 — available for electric equipment only
Floor Insulation	58%	\$0.30–\$0.40 per sq. ft.
Heat Pump Water Heater	46%	up to \$770

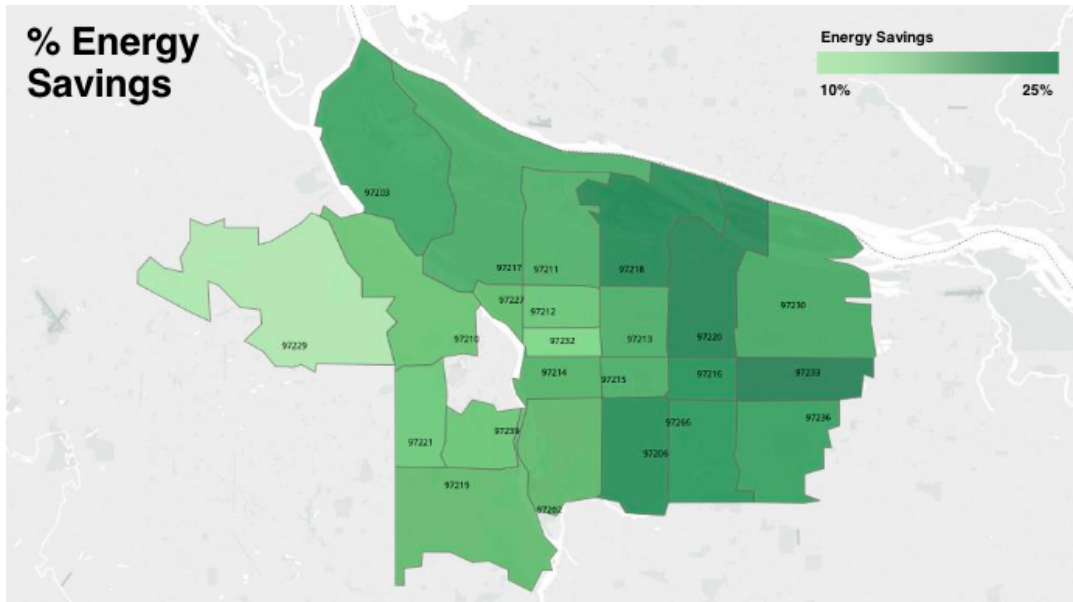


Figure 2. Percentage potential energy savings of homes listed for sale by zip code. *Source:* 2018 Portland HES data.

Customer Engagement Efforts Using Data

Home buyers are a motivated audience and are often thinking about home improvement projects. However, the purchase of a home is a busy time, and energy improvements may not be top of mind. Follow-up communication and customer engagement strategies are subsequently needed to drive project completion. Through the energy advisor pilot, the City of Minneapolis and CenterPoint Energy will test different engagement strategies in 2020 to identify the most effective tactics.

The first approach is a postcard reminding homeowners that their house received an energy score and report and reiterating the resources available to them, with a call to action of contacting an energy advisor. These postcards will be sent in batches to the addresses that received an energy report 8–14 weeks prior, and homeowner follow-up will be tracked so the timing of these postcards can be refined over time. A more customized approach will also be tested, leveraging recommendation data from the energy disclosure report. This approach will feature a letter from CEE, on CEE letterhead and envelopes, calling out the specific recommendations and benefits for making these improvements. The letter will also include information on resources available to homeowners such as utility rebates, financing, and the energy advisor service. Additionally, a seasonal communication will be sent in early fall to remind homeowners that heating season is approaching. In Minnesota, EE project implementation typically follows a seasonal pattern, so this postcard will remind homeowners about the energy report and the benefits of completing the recommendations before winter.

Additionally, Minneapolis evaluated their internal operations for opportunities to engage with residents about the energy report and score. The Sustainability Division discovered that the Construction Code Services office sends a letter to recent homebuyers who have had required health and safety repairs identified during their TISH visit. This existing channel offers a promising opportunity for engagement, leading the City and CEE to develop a one-pager to accompany this letter. The City will also develop a municipal water bill insert that will

encourage homeowners to complete energy upgrades and remind them about the energy disclosure report and score. The success of these tactics will be tracked through the energy advisor service, by recording how participants heard about the service. Results will inform future engagement strategies, with a goal of continual improvement and increasing EE program participation and cost-effectiveness.

The granularity in the Portland HES data set, which is refreshed on a recurring basis, provides insight into building stock characteristics based on age of the home, which often correlates to its location within Portland's jurisdictional boundary. Patterns in home vintage, size, assessed value, and recommended improvements can be mapped to define location-specific opportunities for marketing and promotions. This data interpretation potential can also benefit initiatives that support Energy Trust's diversity, equity, and inclusion goals. When specific measures detailed in the assessment data are extracted and plotted by census tract within the City of Portland's jurisdictional boundary, trends become immediately apparent. In some cases, there are strong correlations between census tracts and the recommended measures detailed in the HES and supported by the assessment data. Energy Trust is working with nonprofit Community Energy Project (CEP) to analyze the relative energy cost impacts on low-income households as compared to the general market. CEP is using HES data in this analysis to support the advancement of EE and its community benefits to low-income households.

An additional use case for the Portland HES data lies in the development of propensity scores. Typically, audit data is based on utility program assessments, so participants are not necessarily representative of the overall housing stock. Linking the audit to home sale activity rather than program participation removes the explicit connection between interest in EE and availability of audit results. Short of conducting a large-scale random sample of the building stock, this can be the most effective way to acquire "training data" for predictive modeling of measure eligibility. Using large-scale audit results from HES predictive models can be adjusted for existing ceiling insulation status as a function of the year the home was built, square footage, assessed value, utility bills, and neighborhood-level effects to identify the best housing stock candidates for the measure. This information can in turn be provided to marketing teams to develop targeted tactics for the population segment living in that housing stock, working with the program team to identify the optimal delivery and marketing strategies.

Local electric utility Portland General Electric (PGE) recently took this approach with the Portland HES dataset. PGE used the Portland HES dataset to develop training data with clear asset tags to support their demand response (DR) interventions in targeted "test bed" locations. The training data derived from the Portland HES building characteristic data points is currently being used to better understand the utility's market for smart thermostat installations and to allow for targeted DR-enabled equipment promotional offers.

Tracking Engagement and Early Outcomes

Minneapolis and Portland adopted these programs with a long-term view on the impact home energy labeling could have on the energy performance of the local housing stock. Both cities are tracking metrics to gauge the impact of their policies, though it will take years to understand that impact in full.

Minneapolis, MN. The City of Minneapolis, CenterPoint Energy, and CEE are working together to track the effectiveness of the tactics being tested in the energy advisor pilot. This includes the number of homes scored, the number of calls received by the Energy Advisor service, insulation

rebate program participation, and the individual response rate of the marketing pieces. This data will be used to determine the effectiveness of these tactics and whether this is a cost-effective way to drive participation in utility EE rebate programs. Unfortunately, the COVID-19 pandemic delayed several of these efforts, so there is little data to be shared outside of the more than 2,000 homes that have been scored as of mid-June 2020.

Minneapolis is also working with CEE to complete desk and on-site quality assurance of the energy data collected during TISH evaluations. To date, this data aligns with the energy information collected during energy audits in Minneapolis. Collecting energy data during time-of-sale inspections continues to be an effective way to collect quality information (Smith 2018). Minneapolis also has a very high compliance rate; since the TISH program has been in place since the 1980s, it has been ingrained into the local home sale process. When comparing the number of TISH evaluations to the Minneapolis Area Association of Realtors sales data, there is an over 95% compliance rate.

Portland, OR. One of the primary ways to measure whether homeowners are taking action to improve the EE of their home is to monitor Energy Trust incentive uptake after a home receives a Home Energy Score. Energy Trust recently conducted an analysis on homes which had received a score between 2017 and 2019. Of those homes, 2,136 homes applied for incentives for EE measures. These upgrades resulted in 955,703 kilowatt hours of electricity savings and 61,752 therms in natural gas savings. Actual savings in homes with Home Energy Scores are likely higher, as Energy Trust programs only provide incentives for those measures which meet the utility cost-effectiveness calculations.

The City recently surveyed residents who purchased homes in Portland in 2018 and 2019 after the program was launched. The survey results are intended to both set a baseline to monitor how homeowner sentiments toward the program change over time as well as to provide immediate insights on consumers' HES awareness, how they are using the information on the scorecard, and how likely they are to pursue recommended upgrades. The responses will also inform improvements to program operations. Homeowners' awareness of Home Energy Score tracked at a similar rate to the program's compliance rate. While many homeowners were aware of the information during their house hunting process, there is a demonstrated lack of recollection around where to find their home's scorecard once the transaction is complete and they move into the home. This underscores the importance of reminding a homeowner of the score's existence.

Future Opportunities

These policies and engagement strategies are just scratching the surface, with many opportunities to build off of the availability of energy labeling information as more data is collected. For example, Minneapolis plans to evaluate this data to help identify equity issues related to the EE of the housing stock. This data can help identify areas of the City that are in need of energy-related investments, and the City has already begun this work with their Green Zones Initiative (City of Minneapolis 2020). The data from this policy can help support such initiatives and better identify specific areas and homes in need of energy improvements. This information can also be used to support workforce development activities, as it provides a metric for the amount of insulation and HVAC work that is needed to achieve City energy reeducation and carbon goals.

In 2018, Portland voters approved a ballot measure initiated by communities of color to create the Portland Clean Energy Fund (PCEF). A 1% surcharge on the retail sales of certain large retailers within Portland will provide approximately \$40–\$60 million annually in grant funding to projects and programs that benefit communities living on the frontlines of climate change. HES data can be accessed by PCEF staff, the grant committee, and proposing organizations to provide insights into specific EE measure opportunities.

Portland also provided HES data to academic researchers examining whether the City's disclosure policy eliminates informational asymmetries between the home buyer and home seller and whether the Home Energy Assessment results impact sale prices across the local housing market.² While hundreds of thousands of transactions may be required before strong indications can be documented as to how scoring information is reflected in property valuation, early research conducted on existing HES program data can provide some initial indications of impacts on the local real estate market.

Conclusion

Time-of-listing energy disclosure policies bring visibility and value to the EE of homes. These policies also provide data on the energy performance of local housing stock at a meaningful scale not achievable through other policy and program efforts. When designing these policies, it is important for a city to consider how data can be used and how this policy could interact with local EE programs. Cities and utilities are often working toward the same goals when it comes to advancing the EE of the local housing stock. Aligning these efforts can help broaden and deepen the impact each has on achieving energy savings and climate goals, as well as provide local energy jobs. The Cities of Minneapolis and Portland offer two examples of how these policies can be used to generate awareness of utility programs, with a goal of increasing program participation and energy savings. Each city is still in the early stages of this effort, but early program results are promising, and they provide a template for the strategic collaboration that can be achieved with local energy program implementers.

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²Without the presence of home energy labels, a home buyer will typically know less than the home seller about the home's energy performance, creating a market failure in that energy-related information in most transactions is asymmetrical.

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