Populating the MLS with Energy Information - A Progress Report

Richard Faesy, Energy Futures Group
Deborah Philbrick, Elevate Energy
David Heslam, Earth Advantage
Ben Hoen, Lawrence Berkeley National Lab
Leslie Badger, Vermont Energy Investment Corp.
Carolyn Sarno, Northeast Energy Efficiency Partnerships

ABSTRACT

When home buyers are able to compare the energy features of buildings as part of the purchase process, it can impact home values, elevate energy to a point of discussion between buyer and seller and, most importantly, influence the level of energy upgrades undertaken when making home improvements after purchase. The way most buyers get their information about potential homes is through one of the 700 local Multiple Listing Services (MLS) in the U.S. However, until recently, including complete and reliable energy information in the MLS has been spotty at best. But that is beginning to change.

Energy efficiency and renewable energy information now have standardized fields in leading MLS systems. Efforts are under way to recognize and encourage all MLS systems to include these fields, and projects are under way in several jurisdictions to auto-populate this energy information into the local MLS. Through auto-population, existing data sets like U.S. DOE's Home Energy Score or solar photovoltaic (PV) system databases can be automatically uploaded and associated with a specific address in the MLS.

This paper provides a survey of on-going efforts in the U.S. that are working on energy information in the MLS and will dive more deeply into a few case studies that highlight some lessons learned regarding technology solutions and stakeholder engagement and guidance for future MLS energy information efforts.

Introduction

Information about the energy features of a home has traditionally been communicated to home buyers in a one-off manner dependent on having real estate agents and sellers that really want to highlight those features. This outmoded model prevents information from entering the real estate transaction at scale in a standardized fashion.

Challenging the status quo is vital because residents' cost of ownership, health, and comfort are all impacted by the way a home uses, and in the case of photovoltaics, produces, energy. Home buyers deserve to know as much information about the home they are purchasing as possible and home sellers should have the opportunity to have their home accurately marketed. Energy efficiency and renewable professionals in partnership with real estate leaders are invested in the idea that energy transparency leads to greater market adoption of energy related home upgrades. Our theory of a change is that of a "virtuous cycle" that is shown graphically below in Figure 1.
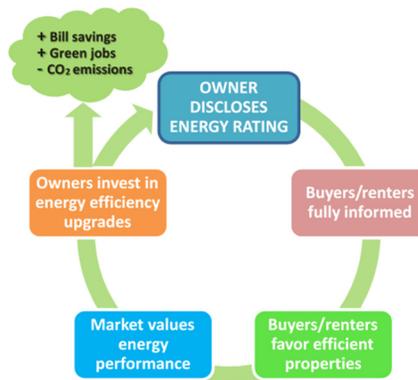
Figure 1. The Virtuous Cycle of Energy Information Disclosure (Dunsky/NEEP 2009)

Background

To understand the process in which energy data might find its way into a real estate listing, one must have knowledge of the players involved in creating those listings. MLS systems are the technology platform in which a member, bound by a given geography, accesses real estate listings. Often, MLSs allow membership only to licensed real estate brokers and their agents. As of February 2018, there were about 650 MLSs in the United States that range widely in geographic footprint and membership size. MLS organizations can develop their own "home grown" technology platforms, but it is more common to license a third-party system such as Black Knight's *Paragon* or CoreLogic's *Matrix*. The fields available in the system are directed by the MLS organization, but implemented by the system company. In addition, it is not uncommon for an MLS organization to have more than one system, especially as organizations in close geographic proximity consolidate. The data that populates these fields can be entered manually or automatically. Third party data providers facilitate access to different types of data from assessed taxes to school districts.

Over 1.3 million real estate professionals (of the 2 million agents in the U.S.) belong to MLSs that are members of the Council of MLS (CMLS), which encourages membership organizations to comply with data standards developed by the Real Estate Standards Organization (RESO). RESO's mission is to "create and promote the adoption and utilization of standards that drive efficiency throughout the real estate industry." RESO's Data Dictionary is the real estate industry's Rosetta Stone, ensuring all MLS systems speak the same language. Included in the list of defined data are a number of energy related fields. RESO's Data Dictionary defines the format that data should take. For example, consistent naming for home energy certifications and whether the data type is numeric in the case of a score such as HERS or text in the case of a rating such as LEED. This standardization opens up the opportunity to incorporate large quantities of energy related data in home listings. Consistent data is important when pulling information on comparable sales ("comps") when specific features need to be searched such as homes of a similar size or with a particular energy certification.

Data enters an MLS listing through a number of pathways. Some information, like property taxes and school districts, may be automatically populated ("auto pop") into a listing through a data aggregator's service that collects and packages publicly available data for MLSs, like *Realist* from CoreLogic. Usually, a real estate professional can subsequently edit auto-populated data. Data can also be manually entered by the listing agent. This might be helpful if a

homeowner has recently added a new bathroom or if there are special features of the home that the agent would like to highlight in the open ended "public remarks" section. Traditionally, energy information has been included in this section as there were not designated fields for this data. Energy data champions have long been proponents of auto-populating energy-related data into the MLS versus manual entry because it increases the likelihood that the information will be made available and it increases the accuracy of data entered into the listing.

There are many different types of energy related data that can be included in a listing such as whole building certifications and scores as well as energy production details. The Home Energy Information Guide provides guidance to real estate professionals and MLSs on utilizing this information (CMLS 2017). Recently, a number of organizations have been working to get large quantities of third-party verified energy related information into MLSs. These are typically organizations that have private databases with a large amount of energy certification information. Residential Energy Services Network (RESNET), for example, is interested in providing access to their HERS data. U.S. Green Building Council's (USGBC) LEED for Homes, the Department of Energy's Home Energy Score, and Home Innovation Research Lab's National Green Building Standard are all working to get direct lines of data populated to MLS systems or their vendors.

Creating a defined data pathway for home energy information is important because research shows that markets respond positively, and thus that the virtuous cycle is indeed viable. In Bexar County, Texas, where San Antonio is located, researchers showed that the presence of an energy certification or rating increased the selling price by 1%, green features (i.e., drought tolerant plants and enhanced air filtration) by 2%, and energy efficient features (i.e., increased insulation) by 6%(Cadena and Thomson 2015). A recent meta-analysis of about 20 other studies estimated an average price premium of 4.3% +/- 0.6% for environmentally certified homes (Brown and Watkins 2015). Price premiums associated with energy transparency is not only limited to the United States. Dunsky Consulting completed a jurisdictional scan of the European Union and found that a more favorable home energy label appreciated home values (Hill et al. 2016).

Despite these positive indicators, some stakeholders remain wary regarding the consumer privacy concerns of sharing energy information. Addressing and solving for privacy concerns and data sharing consent is paramount to populating the MLS with energy information, but there are not universal hard and fast rules. Existing privacy laws and regulations provide greater protection for operational data (i.e., actual utility bill data), where a clear link from the energy data to sensitive personally identifiable information can be made. There are no Federal or state laws that deal explicitly with the disclosure of asset-based ratings, scores and/or certifications outside of mandatory disclosure ordinances, such as those in Portland, Oregon or Berkeley, California. However, home energy labeling efforts that are implemented on a voluntary basis are subject to contractual obligations. It is through these contracts or agreements that customer consent is handled. The most common approach is a customer consent form (opt in/out) completed by the customer upon enrollment of a local program. Some national certifying bodies such as USGBC, Passive House and RESNET, consider selected energy certification data to be public such as the final rating or score. Applicants must opt-out for their data to remain private.

Current Regional/National Initiatives

The following section outlines a number of initiatives that will be useful for those interested in promoting the integration of home energy information into the real estate transactions in their own regions including technical solutions and formal working groups.

Membership is diverse, including State Energy Offices, MLSs, energy efficiency advocates, data providers, and more.

Technical Solutions

As home energy certification and labeling initiatives increase in use, there is more energy related information for more homes than ever before. Two leading technology solutions have been developed to bridge the information gap that exists between green certifications, energy rating systems, energy efficiency programs and the real estate market, The Home Energy Labeling Information eXchange (HELIX) and the Green Building Registry™. HELIX and the Green Building Registry rely upon DOE's open-source Standard Energy Efficiency Data Platform™ (SEED), guaranteeing data integrity and interoperability for the long term. As Figure 2 illustrates, HELIX and Green Building Registry act as energy data aggregators, providing a single source of verified energy data for the real estate industry.
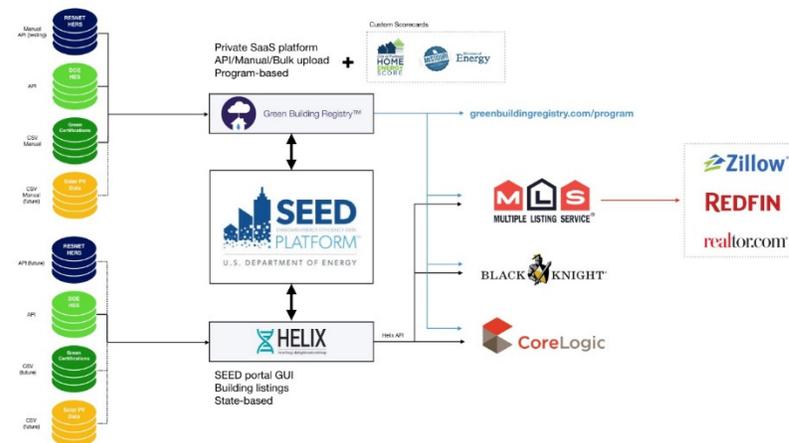
Figure 2. Representation of Data Flows

Home Energy Labeling Information eXchange (HELIX). Stakeholders from the energy efficiency and real estate industries came together to form the HELIX[1] team in 2016. HELIX is currently focused on providing a solution for the Northeast region, while aiming to provide a replicable, open-source model that can be used elsewhere. The purpose of this project is to develop a database capable of being auto-populated with home energy information and subsequently auto-populating real estate listings with that data. Sources of home energy information include national scoring programs such as the U.S. DOE Home Energy Score and HERS Ratings, as well as state and local program certifications. Homes that have installed PV systems are also being populated in HELIX[2].

Green Building Registry. The Green Building Registry™ was developed by Earth Advantage in 2017. The design of the Green Building Registry was informed by ten years of efforts to address this market problem through other means. In that time Earth Advantage coordinated efforts with Build It Green® in California, and other members of the U.S. DOE Home Energy

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[1] HELIX is facilitated by the Northeast Energy Efficiency Partnerships (NEEP) through a U.S. DOE grant. http://www.neep.org/home-energy-labeling-information-exchange-helix
[2] Currently for Vermont and Massachusetts.

Information Accelerator program. The primary goal of the Green Building Registry is to develop a scalable solution that meets a program's wish to share home performance data with real estate systems that store and transfer home data.

The architecture for the Green Building Registry relies on an application layer on top of SEED to handle the incoming and outbound data. The benefit of this approach is that additional data services can be provided without being restrained by some of the shortcomings of SEED and HPXML, like slow speeds of transfer. For instance, Home Energy Score data validation and custom report generation services have been added to the Green Building Registry application layer. Additionally, the system is capable of matching records in SEED with associated scorecard or certification PDF files. In practice, this allows a real estate agent to upload Green Building Registry data to an MLS listing in less than two seconds.

Guidance from Collaborative Groups

In addition to the technical solutions discussed above, a number of forward thinking working groups have provided guidance on best practices to align industry priorities and streamline data transfer. Lawrence Berkeley National Lab spearheaded a learning network with the mission of getting residential PV data into the MLSs. The "Energy Metrics to Promote Residential Energy Scorecards in States" ("EMPRESS") project is a State Energy Office-led project working to better align data elements in two of the most common energy ratings, HERS and Home Energy Score.

LBNL PV Auto-Pop Efforts. In 2016, Lawrence Berkeley National Laboratory (LBNL) co-authored "Capturing the Sun: A Roadmap for Navigating Data-Access Challenges and Auto-Population Solar Home Sales Listings", which was the product of over 60 subject matter experts (Stukel et al. 2016). The goal of the work was to lay out a potential path to implement a system to automatically populate solar home characteristics into MLSs (or "PV auto-pop"). Since then, a number of significant steps have been made to see PV auto-pop implemented. For example, as is discussed in the Vermont case study below, the New England Real Estate Network (NEREN) adopted a pilot PV auto-pop program in the fall of 2017 allowing NEREN users to access Vermont PV data for systems expected to be installed through end of 2016. Efforts are currently underway to populate 2017 Vermont installations into that same system. In Massachusetts, data for roughly 70,000 solar systems have been provided for the MLSs and plans to auto-pop them in MA MLSs are underway. Additionally, LBNL continues to focus on obtaining access to solar data for this purpose (e.g., in Connecticut and Rhode Island) as well as exploring ways to combine publicly available datasets that each have only some of the key fields MLSs seek to auto-pop, but together will have greater value.

EMPRESS. The "Energy Metrics to Promote Residential Energy Scorecards in States" ("EMPRESS") project is a State Energy Office-led project, supported by funding from the U.S. DOE and private sector partners. The states' objective in undertaking the project is to advance large-scale home energy labeling, and harmonize various energy scoring programs to better support the market valuation of energy efficient homes. Goals of the effort include more closely coordinating the Home Energy Rating System (HERS) and Home Energy Score, so that ratings and performance data are comparable and translatable, developing and promoting model approaches and programs that encourage the voluntary use of residential energy data, and educating real estate market stakeholders and other others about the policies, programs,

processes, and market-facing information associated with a harmonized approach to home energy labeling. With more harmonized building information, there is a higher likelihood that MLSs and others will trust and value this information.

Forums for Shared Learning

There are a number of stakeholder working groups interested in advancing energy transparency in real estate that have been active recently. Some of these are discussed below.

Home Energy Information Accelerator (HEIA). The Home Energy Information Accelerator (HEIA) was a U.S. Department of Energy Better Buildings initiative designed to expand the availability and use of reliable home energy information at relevant points in residential real estate transactions (US DOE 2018). It functioned as a collaborative effort among national organizations, federal agencies, and regional, state, and local leaders in real estate and energy efficiency. Accelerator Partners developed and demonstrated replicable, sustainable approaches that make energy related information – important data for the home buying process – easily available to home buyers and sellers through multiple listing service (MLS) and other reports. A report was published in May 2018.

NASEO Buildings Committee. The National Association of State Energy Officials (NASEO) has been supporting information sharing related to building energy labeling for decades. As the original facilitator of HERS discussions between states and the U.S. DOE that gave birth to RESNET and the HERS industry in the 1990s, NASEO has long played a prominent role in making energy visible. Most recently, NASEO has organized building energy labeling focused meetings as part of their annual and quarterly meetings, which has resulted in collaboration between states, the U.S. DOE and other organizations. Discussions out of these NASEO events have spurred the HELIX and EMPRESS projects, furthering the progress of moving energy information into the MLS and harmonizing energy ratings for consistency, greater public recognition and broader acceptance**.**

Real Estate Standards Organization (RESO). The Real Estate Standards Organization (RESO) is integral to the population of MLSs with energy information. To encourage member MLSs to adopt and implement standard data fields, RESO established a multi-year certification effort. The deadline for obtaining Silver certification, the level which includes green and energy-related fields, was January 1, 2018. There are now over 200 MLSs that have achieved Silver or higher compliance[3]. RESO provides a number of learning opportunities through their annual technology summits and conferences. RESO Workgroups strive to continually improve the data standards and partner with energy industry professionals to inform energy-related activities.

Regional and Local Information Sharing. Beyond national forums for shared learnings, regional and state-focused opportunities have been taking place that have resulted in progress with local MLSs. In the Northeast, NEEP has leveraged the development of the HELIX database project to foster relationships with MLSs that serve most of the New England states to advance auto-populating initiatives that link HELIX to their systems. The Oregon Department of Energy

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[3] As of Spring 2018 RESO had over 300 applications still in the queue and expect to have over 500 organizations certified to Silver or higher by Summer 2018.

(ODOE) administers state rules on energy scoring and oversees an industry stakeholder group that reviews scoring systems for compliance. In 2018 ODOE plans to provide a voluntary statewide Home Energy Score program that will provide connectivity to MLS systems. In Vermont, Efficiency Vermont has supported the "Vermont Green Homes Alliance" that has promoted energy visibility efforts since 2008.

Case Studies

Chicagoland

In 1987, the City of Chicago passed an ordinance that required the disclosure of gas bills when residential properties were sold or leased. In the beginning, the process to track down this information was time-consuming and could be frustrating. In July 2013, Chicagoland's MLS provider Midwest Real Estate Data, LLC (MRED), the City of Chicago, and Elevate Energy worked together to update the ordinance and automate the process, making it possible for agents to get both gas and electricity cost data with just a few clicks.

Upon user request, connectMLS, MRED's MLS system, submits the property address and utility account numbers to MyHomeEQ, Elevate's proprietary platform, which then returns annual average energy costs to connectMLS. At this point in the process, the obligation to the ordinance is considered fulfilled. The real estate agent then has the option of downloading and attaching to the listing a PDF that shows cost and usage.

The motivation to update the ordinance was to create an easier path to compliance by automating the process, but challenges still exist. While users may *choose* to comply with the ordinance via automated utility bill disclosure, it is not required. Currently, about fifteen percent of detached single-family listings disclose their energy costs electronically via the MLS. There is no tracking mechanism to know how many owners simply communicate this information in paper format at closing. There is clearly room for improvement in compliance and tracking, but the systems have been put in place to automate the transfer of utility bill data to the MLS in Chicagoland. Training and education efforts are underway to increase awareness of the ordinance and automated compliance option.

Portland, Oregon

There has long been an interest in promoting the energy efficiency of homes in Oregon for both the capture of asset value in a sale but also the documentation of value in an appraisal. The first state law on the topic dates to the 1970s, and in the Spring of 2007 the Regional Multiple Listing Services™ (RMLS) board of directors voted to add green fields to their system, becoming the first MLS system to do so in the nation.

This was a result of green building advocates and individual real estate professionals working together. Within a year, discussion began about the possibility of auto-populating the RMLS with green certification data, but the lack of a single data source and an overall lack of home performance data stymied that effort. In 2009 environmental groups tried to mandate home energy labeling for all homes at time of sale. This legislative effort did not produce a mandate, but it did create a multidisciplinary working group that analyzed the concept for a year. That group recommended that a voluntary approach be followed for the time being because the home energy scoring infrastructure did not have the capacity to accurately forecast potential results or costs for a mandatory policy. In 2013 a separate legislative effort, House Bill 2801, was started

by home performance contractors to standardize home scoring in Oregon. That effort was successful and a wide array of stakeholders was convened to create a set of state rules for scoring.

Real estate professional participation was key in that process and led to the state licensure of home energy scoring professionals. The real estate community understood that the energy efficiency community wanted them to trust and utilize home performance data, and in return they demanded that the energy professionals who are responsible for providing home data meet a state standard for doing so. The rules also analyzed different scoring tools and decided that for the sake of consistency only the DOE Home Energy Score tool could be used for customer facing estimates of home energy use.

These statewide efforts paved the way for the City of Portland City Council to pass an ordinance requiring a Home Energy Score at time of listing in late 2016 although support in the community was mixed. The Portland program requires nearly all Portland for-sale listings to include the City of Portland Home Energy Score report. When the Portland policy passed, auto-pop of energy information had been an active topic of conversation for RMLS and other stakeholders for years. By early 2016 there was a good understanding of what a technical solution could look like. When the policy was passed there was increased interest in auto-pop from RMLS users. Before the policy there was only green data on a small fraction of homes and therefore it's perceived usefulness was low. With nearly every home in need of this data auto-pop was viewed as something that would make compliance much easier for listing agents.

The Green Building Registry was first launched in late 2017 as a primary component of the City of Portland Home Energy Score Program. The City of Portland became a Home Energy Score Partner and enabled Earth Advantage to use the City's partner credentials to connect the Green Building Registry to the DOE Home Energy Score database. This connectivity allows individual home energy assessors to upload a specific home's Home Energy Score data into the registry and preview, then finalize a local Home Energy Score report. Once a report is finalized by the assessor it can be accessed through a public search portal and it is available for auto-pop to the RMLS. The RMLS maintains its own MLS technology and was readily able to connect to the Green Building Registry API and add a one-button upload process into its system. The process is simple for agents to use. In the first three months of the policy over three quarters of listings utilized the auto-pop functionality to include the Home Energy Score information in their listing. The remainder were able to access the information at the public search site of Green Building Registry and then upload the information manually into the listing.

Before the Green Building Registry was the chosen database solution for auto-popping the MLS, several dead-end concepts were attempted. Storing home performance data on local tax assessor databases was one, and establishing a data sharing relationship with CoreLogic was another (Earth Advantage 2013). Both of these solutions were explored for the primary reason that the MLS already receives data from these sources. However, both endeavors failed largely due to the low volume of home performance data available, which is now being addressed by Portland's mandatory ordinance.

These early efforts did identify key data issues such as chain of custody and sharing rights. Sharing home performance data according to the needs of the real estate market became the focus efforts moving forward and ultimately led to the development of a dedicated database that could provide home performance data on demand through an API or through public search. It also meant that managing the status of data as public and shareable became a paramount concern for the solution.

Although hundreds of home listings per week in Portland are now having their Home Energy Score report auto-populated, barriers remain to ensure home energy performance is easily and accurately valued. While RMLS stores this data in RESO compliant format, real estate portals such as Redfin, Zillow and REALTOR.com that subsequently receive this data may not. This inconsistency in the display of data diminishes the market impact that home energy scores can have. The initiatives described above continue to help ensure the consistency needed from generation, storage and ultimately sharing of home energy performance data

Vermont

Vermont has been working on making energy visible to home buyers and sellers since 1987 when the first HERS ratings were issued. In the early 1990s, the local MLS, was paid through a U.S. DOE grant to cover the development costs for adding a "HERS Rating" field. This survived a few years until a new MLS provider with different software was unwilling to change their system. However, efforts to work with local Realtors, lenders appraisers and the current MLS provider (NEREN) has continued. These efforts have resulted in numerous successes and partnerships with NEREN, which is now the local MLS provider for all Vermont and New Hampshire and parts of other New England States.

Since 2011, Efficiency Vermont has been providing information from approximately 300 HERS ratings annually to NEREN. This data is used for comparable sales ("comps") by appraisers, Realtors and others. This data sharing has been enabled by including language that releases this information upon enrollment in the Efficiency Vermont program[4], thereby overcoming any data privacy issues. In the past seven years since providing this information, only a few have declined.

The Vermont Green Homes Alliance, a collaboration of about a dozen builders, lenders, Realtors, appraisers, affordable housing providers, utilities, NEREN and others, has been working since 2008 toward the mutual goal of making energy information visible. These efforts have resulted in numerous successes with the MLS. These include NEREN taking early steps to become RESO Gold compliant, their staff becoming the first chair of the CMLS Green Section Council, partnering with HELIX to expand beyond just Vermont new construction data to include energy information for both new *and* existing homes throughout New England and becoming the first MLS in the U.S. to auto-populate solar photovoltaic (PV) data.

LBNL's "Capturing the Sun" initiative identified Vermont as a potential state to move their solar PV data into the MLS. Privacy concerns, which hamper many data sharing efforts, were alleviated because the Vermont Public Utilities Commission determined that the "Certificate of Public Good" (CPG) permit filings accompanying each PV net-metered application are public information. This PV data was already being displayed in the Energy Action Network's Community Energy Dashboard "Energy Atlas" as a way to help towns monitor and plan for meeting state energy goals (EAN 2018). The challenge was to establish the data flow between the Vermont Public Service Department that accepts and holds the PV net-metered applications, the Vermont Public Utilities Commission that issues the CPGs and Energy Action Network that reviews and cleans up the data before posting it on their Community Energy Dashboard.

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[4] Efficiency Vermont includes a Home Energy Rating Information Release in the Residential New Construction program Terms & Conditions: https://contractors.efficiencyvermont.com/residential-new-construction-terms-conditions

This solar PV data was reviewed for compatibility with the RESO Data Dictionary "Power Production" fields and provided to NEREN's data aggregator, CRS Data. NEREN MLS listings can now be auto-populated whenever someone brings up a Vermont home that has a solar PV system installed before 2017. The home seller or Realtor aren't required to know all the details about the system size or installation date, it auto-populates based on the data provided by the State of Vermont. Work is underway to prepare 2017 PV data and to establish a more automated process for providing this data to CRS Data in the future.

When HELIX is fully functional, PV information will reside in that database alongside other home performance data provided by Efficiency Vermont. CRS Data will be able to pull this data automatically via an API and make it available to NEREN for auto-population of listings.

Connecticut

In May 2015, Connecticut launched the nation's first statewide residential energy labeling program using the U.S. Department of Energy's Home Energy Score tool (Glickman 2015; US DOE 2018). In Connecticut, Energize Connecticut's Home Energy Solutions (HES) service assesses the energy efficiency of a home based on its structure and heating, cooling, and hot water systems, making energy efficiency labels universal across the state (Energize CT 2018). Home Energy Solutions provides customers with the assessment, incentive and financing services to reduce energy consumption and costs. The program will eventually help reduce the energy cost burden residents face by encouraging an understanding of energy data within the residential sector. The Connecticut Energy Efficiency Fund funded both United Illuminating Company and Eversource to integrate the Home Energy Score into their HES programs (Energize CT 2018).

The introduction of this flagship residential energy efficiency program was important for Connecticut considering the high energy prices and the fact that nearly 72 percent of housing units in Connecticut were built before 1979. The state's antiquated housing stock has older homes that are typically less insulated, and have higher energy costs due to their age, and less efficient appliances and equipment.

Since launching the Home Energy Score program, Connecticut has produced around 25,000 scores to date. The collection of home energy information and incentivizing home energy retrofits helps the state track its progress in meeting its goal of weatherizing 80 percent of homes by 2030, and achieving its long-term goal of reducing greenhouse gas emissions 80 percent below 2001 levels by 2050. In order to support the "virtuous cycle", this data must go beyond the HES program providers and their customers.

Currently Connecticut is one of 7 states taking part in the HELIX pilot. Collecting and storing residential energy data in HELIX will lead to an increased awareness of and demand for energy efficient homes. The HELIX team is conducting outreach to MLSs, Real Estate Associations, and Realtors with Green Designation, to broaden real estate industry knowledge regarding green homes, green home energy labels, and HELIX as a resource for discovering this information. Full scale HELIX implementation could include the Connecticut's 25,000 Home Energy Scores provided that data privacy issues are adequately resolved. This is an on-going conversation in Connecticut, as it is in other states[5].

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[5] Connecticut's HES program currently does not incorporate a data sharing agreement or consent form. The programs are considering an 'opt-in' approach which may result in very little participation.

Colorado

The Colorado Energy Office (CEO) began a comprehensive effort to have home energy efficiency information available for real estate transactions starting in 2010. CEO convened a wide spectrum of stakeholders and began work on a variety of efforts, including the auto-population of home performance data into MLS systems operating in Colorado.

An initial step towards auto-population was to first have the data fields exist in the MLS systems. Starting in 2010 CEO worked with all the MLS systems in Colorado to adopt a consistent set of green fields. Information and Real Estate Services (IRES), the MLS that serves Northern Colorado, was the first MLS in Colorado to adopt the green fields and by 2013 all but two of the systems had adopted them.

There was also a need to ensure a supply of standard home energy performance records that could be entered into listings. New home construction in Colorado already had a relatively high utilization rate of HERS ratings, but CEO took further steps to promote HERS ratings. In order to facilitate the availability of data for existing homes the CEO became a Home Energy Score partner in the Fall of 2015 and established a network of Home Energy Score assessors who could provide scores across much of the state.

By 2016 there was enough activity taking place that CEO decided to create a central database that could host statewide home performance data. In late 2016, they put out an RFP for a vendor to create the Colorado Energy Information Database. The RFP intended for the database to include a public portal containing summary statistics and visualizations of aggregated data. In addition, select users of the database (such as local jurisdictions, system installers, and appraisers) were to have the ability to upload and refine distributed energy system data subject to approval by database administrators. The database design was to provide an API to integrate seamlessly with the MLS, allowing users to see energy system information from the database without leaving the MLS interface. The intention was to pilot the MLS integration with IRES in Boulder County in 2017.

Although a basic version of the database was created, auto-population via API was not piloted. Both the IRES and CEO had concerns about whether the data, provided by various sources, could be maintained as accurate, verified and up-to-date over time. CEO did not have the resources to ensure this oversight would continue and IRES did not want to connect to a service unless they were assured that the data would be regularly maintained past the pilot phase.

IRES is still interested in connecting via API to a source of verified home energy information, but they do not want listings to be auto-populated. Rather, IRES prefers a service similar to what is delivered by Walkscore where data is hosted on an external website that users access via URL link in the listing. IRES is also interested in a single comprehensive source of verified data including distributed energy generation, Home Energy Scores, HERS ratings and certifications. This would enable them to manage one connection for green data and provide data across multiple counties within their MLS service territory. These discussions are on-going.

Lessons Learned & Recommendations

Updating the MLS with energy information is a work in progress. There are pockets of development and some early successes, but also some fits and starts, with more work to be done to standardize data, connect the energy information to accessible databases, address some key issues like data privacy and data maintenance, demonstrate market value and build relationships

with the real estate industry. While we are making progress, we certainly aren't there yet, but have learned some key lessons and have a few recommendations, including the following:

- Establish relationships and build trust with local, regional and national MLS providers to gain local legitimacy, demonstrate value and support them in taking national leadership positions promoting policies to green the MLS;
- Demonstrate consumer interest and demand for green and energy efficient features, then show how including energy information can help better position MLSs to meet that demand to position their service, locking in energy information fields;
- Address data privacy issues up front by incorporating opt-out language in customer enrollment documents to avoid a retroactive opt-in process to enable data sharing, which will result in a much lower participation rate;
- Put in place systems to regularly update and clean the energy data to provide the assurances that MLSs need to lock into a long-term relationship; and
- Clean energy programs should provide RESO-compliant data with connections to energy data repositories that are easily uploaded into MLSs as a standard part of program design to help facilitate energy visibility and market transformation.

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