

Residential Building Energy Labeling Working Group & Commercial and Multiunit Building Energy Labeling Working Group:

**Report to the Vermont House Committee on Energy and
Technology and the Senate Committees on Finance and
on Natural Resources and Energy**

As Called for by Act 62 of 2019

January 15, 2021

Submitted by:
Vermont Department of Public Service

Acknowledgements

The Building Energy Labeling Working Groups included the individuals and organizations listed below, some of which were appointed by the Commissioner of Public Service as directed by Act 62 of 2019 and others who volunteered to participate and lend their expertise. The two groups collectively dedicated countless hours to researching, discussing, and formulating recommendations regarding the issue of building energy disclosure for residential, multifamily, commercial, and mixed-use buildings. This report is the result of the collaborative work of these experts.

The Department appreciates the dedication and effort put forth by the members and participants over the last year, particularly given the challenges that arose due to COVID-19. We would like to acknowledge the following individuals for their time devoted to this effort:

Residential Building Energy Labeling Working Group

Appointed members:

Vermont Department of Public Service Representative – Kelly Launder
Expert in the design, implementation, & evaluation of energy efficiency programs and policies – Richard Faesy, Energy Futures Group (Co-chair)
Efficiency Vermont Representative – Chris Gordon (Co-chair)
Burlington Electric Department Representative – Tom Lyle
Vermont Gas Systems Representative – Karen Horne
Vermont Office of Economic Opportunity Representative – Josh Larose
Vermont Community Action Partnership Representative – Paul Zabriskie, Capstone
Vermont Housing & Conservation Board Representative – Craig Peltier
Building Performance Professionals Association Representative – Malcolm Gray, BPPA Board Chair
Vermont Association of Realtors Representative – Martha Lange, Berkshire Hathaway Home Services Vermont Realty Group
Other members with expertise in energy efficiency, building design, energy use, or the marketing and sale of property – Melanie Paskevich, Neighborworks of Western VT & Tim Yadow, Central Vermont Office of Economic Opportunity

Other stakeholder participants:

Keith Levenson, Vermont Department of Public Service
Geoff Wilcox, Vermont Office of Economic Opportunity
Michael Russom, Burlington Electric Department
Leslie Badger, Efficiency Vermont
Amy McClellan, Milne-Allen Appraisal Company
Jeffrey Gephart, Real Estate Trade Ally Outreach, Efficiency Vermont
Chris West, Home Builders Association
Robert Lehmert, Carbon Negativity
Peter Tucker, Director of Advocacy and Public Affairs, Vermont Association of Realtors®

Additional Assistance from:

Carolyn Goldthwaite, Northeast Energy Efficiency Partnership
Maddie Koewler, National Association of State Energy Officials
Veronique Bugnion, ClearlyEnergy

Subcommittees:

Label and Rating Tool Subcommittee
Scores and Reporting Subcommittee
Home Assessor Subcommittee
Labeling Impact Subcommittee

Commercial and Multiunit Building Energy Labeling Working Group

Appointed Members:

Vermont Department of Public Service Representative – Keith Levenson
Expert in the design, implementation, & evaluation of energy efficiency programs and policies – Keith Downes, Guidehouse Consulting (Co-chair)
Efficiency Vermont Representative – Michael Crowley (Co-chair)
Burlington Electric Department Representative – Michael Russom
Vermont Gas Systems Representative – Michael Gifford
Vermont Office of Economic Opportunity Representative – Geoff Wilcox
Vermont Community Action Partnership Representative – Randy Drury, 3E Thermal
Vermont Housing Conservation Board Representative – Craig Peltier
Vermont Association of Realtors Representative – Tim Heney, Heney Realtors

Other stakeholder participants:

Kelly Launder, Vermont Department of Public Service
Jennifer Green, Burlington Electric Department
Dan Edson, Vermont Buildings and General Services
Phil Cecchini, Capstone Community Action
Peter Tucker, Vermont Association of Realtors
Gretchen Schimelpfenig, Burlington Electric Department
Chris Burns, Burlington Electric Department

Additional Assistance from:

Katie Mason, Cx Associates
Krystina Kattermann, Cx Associates
Cliff Majersik, Institute for Market Transformation
Casey Michael O’Hara, Vermont Department of Taxes

Subcommittees:

Research Subcommittee
Building Performance Reporting Subcommittee
Building Assessor Subcommittee
Management and Impact Subcommittee

Table of Contents

Acknowledgements.....	2
Residential Building Energy Labeling Working Group.....	2
Commercial and Multiunit Building Energy Labeling Working Group	3
Executive Summary.....	7
Introduction	7
Act 62 Requirements for Building Energy Labeling Working Groups	7
Composition of the Energy Labeling Working Groups.....	8
Previous Vermont Building Energy Labeling Working Groups.....	8
2011 Act 47 - Building Energy Disclosure Working Group	8
2012 - Thermal Efficiency Task Force.....	9
2013 Act 89 - Building Energy Disclosure Working Groups & Report.....	9
Residential Building Energy Labeling	10
Summary of Recommendations.....	10
Energy Label – Home Energy Profile	10
Reporting Requirements & System for Maintaining Information	11
Administration and Oversight.....	11
Public Disclosure of Information.....	11
Requirements and Training for Home Assessors	11
Recommendations to Increase the Impact of the VHEP.....	12
Scope.....	12
Label and Tool	13
Label Design and Content	13
Energy Label Creation	17
Asset, Operational and Automated Energy Labels	18
Rating Score and Reporting	20
Reporting Requirements	20
System for Maintaining Scores and Information	22
Field Testing of Data Collection and Transfer Systems.....	23
Appeals Process, Recourse to Challenge Results	23
Administration, Implementation and Overall Entity in Charge	23
Customer and Technical Support.....	24
HELIX Access & Data Protocols	25

Public Access to Labeled Building Results.....	25
Home Energy Assessors	26
Requirements for Building Assessors Including Endorsements, Licensure and Bonding	26
Programs to Train Home Energy Assessors	27
Quality Assurance Provider	28
History of Vermont’s Energy Rating and Labeling Activities.....	28
Asset Rating for New Homes	28
Asset Rating History for Existing Homes	28
Other Energy Information Dissemination Initiatives in Vermont	30
Labeling Impacts	33
Regional, National and International Energy Labeling Impact Studies.....	33
Actual and Potential Impacts in Vermont.....	36
Realtor Feedback – Vermont Association of Realtors Survey.....	37
Labeling Impact Conclusions.....	38
Budget Recommendations for Residential Building Energy Labeling Efforts	39
Commercial and Multiunit Building Energy Labeling.....	41
Summary of Recommendations.....	41
Voluntary vs. Mandatory Labeling Program	41
Energy Label and Benchmarking Tool.....	41
Rating Score and Reporting	41
Statewide Management.....	42
Training and Technical Support	42
Public Access to Building Energy Data	42
Quality Assurance (QA)	42
Scope.....	42
Research into Building Energy Labeling in Other Jurisdictions	43
Voluntary vs. Mandatory Labeling Program	45
Label and Benchmarking Tool.....	46
Label Design and Content	47
Rating Score and Reporting	51
Rating Score	51
Reporting Requirements	51
Data and Records Management	52

Administration, Implementation and Overall Entity in Charge	52
Program Implementation Schedule	54
Training and Technical Support	55
Public Access to Building Energy Data	55
Appropriateness and Viability of Publicly Disclosing Benchmarking Results.....	59
Tenant Lease Language.....	59
Building Assessors	60
Building Assessor Credentials	60
Licensure and Bonding Requirements	61
Quality Assurance	61
Evaluation	61
Impacts on the Vermont Housing and Real Estate industry in Vermont.....	61
Overall Budget	63
Appendix A: Pros and Cons of Mandatory Residential Building Energy Labeling	64
Appendix B: New Home Asset Rating	66
Appendix C: History of Asset Rating for Existing Homes	70
Appendix D: Mandatory Building Energy Labeling Program - Vendor Proposal.....	75

Executive Summary

Act 62 of 2019 called for the convening of a Residential Building Energy Labeling Working Group (Residential Working Group) and a Commercial and Multiunit Building Energy Labeling Working Group (Commercial Working Group), to be comprised of members with energy efficiency expertise and to be appointed by the Vermont Department of Public Service Commissioner by September 1, 2019. Twelve members were appointed to the Residential Working Group and nine members were appointed to the Commercial Working Group. The Working Groups, which were comprised of appointed members as well as other stakeholders, met monthly starting in November 2019 with additional subcommittee meetings in-between. Subcommittee members conducted the necessary research and discussions to propose recommendations in their assigned areas, which were brought back to the Working Group for discussion and finalization.

Both Working Groups are recommending voluntary building energy disclosure initiatives for Vermont. Each group has also selected a tool for gathering energy data and creating a label for residential and commercial buildings. Each Working Group determined a presentation format for inclusion of energy data (such as energy use and costs) on a label for a simplified overview of the home or building energy use. Both Working Groups recommend that the state's Energy Efficiency Utilities ("EEUs" - Efficiency Vermont, Vermont Gas, and Burlington Electric Department) collaborate to administer the work required under a voluntary labeling program provided that funding is available and that the scope for the work is consistent with the resources available to carry it out. It is also recommended that Advisory Committees be created to govern the initiatives and to determine the overall roles and requirements for administration of a voluntary labeling program.

There was consensus on a majority of the recommendations proposed by the Working Groups. For those where there was not clear consensus, the appointed members of the group voted to obtain a final decision. When there was opposition to the Working Group recommendations or other points that a member or stakeholder wanted to raise in regard to the recommendation, it is noted in the report.

Introduction

This report is being submitted by the Vermont Department of Public Service on behalf of the Residential Building Energy Labeling Working Group and the Commercial and Multiunit Building Energy Labeling Working Group as called for in Act 62. This report includes the information and recommendations that the Working Groups were directed to advise the Department of Public Service Commissioner on in Act 62 (see list below), as well as background information on previous building energy disclosure efforts in Vermont.

Act 62 Requirements for Building Energy Labeling Working Groups

Act 62 of 2019 called for the convening of a Residential Building Energy Labeling Working Group and the Commercial and Multiunit Building Energy Labeling Working Group.

The Working Groups were directed to advise the Department of Public Service Commissioner on the following:

- (1) requirements for home assessors, including any endorsements, licensure, and bonding required;

- (2) programs to train home energy assessors;
- (3) requirements for reporting building energy performance scores given by home energy assessors and the establishment of a system for maintaining such information;
- (4) requirements to standardize the information on a home energy label; and
- (5) other matters related to benchmarking, energy rating, or energy labels for residential, commercial, and multiunit buildings.

Additionally, a report and recommendations were required to be completed and submitted to the General Assembly by January 15, 2021 on the following:

- the appropriateness and viability of publicly disclosing the results of benchmarking as defined in 30 V.S.A. § 61; and
- the impact of benchmarking, energy labelling, and energy rating, upon the housing market and the real estate industry in Vermont.

Composition of the Energy Labeling Working Groups

Act 62 directs the Commissioner of Public Service to appoint representatives of a variety of stakeholder groups to the Working Groups, including:

- An expert in the design, implementation, and evaluation of programs and policies to promote investments in energy efficiency
- A building performance professional (Residential Working Group only)
- A representative of each energy efficiency utility
- A representative of the State Office of Economic Opportunity or designee
- A representative of Vermont's community action agencies
- A representative of the Vermont Housing and Conservation Board
- A representative of the real estate industry, appointed by the Vermont Association of Realtors
- Experts in energy efficiency, building design, energy use, or the marketing and sale of real property

Previous Vermont Building Energy Labeling Working Groups

There have been multiple statewide initiatives on building scoring, labeling, and disclosure over the last ten years. These have included the "Building Energy Disclosure Working Group" in 2011, the "Thermal Efficiency Task Force" in 2012, the Building Energy Labeling Working Groups established in Act 89 of the 2013 Legislative session, and now the recent Residential and Commercial Working Groups from Act 62 of the 2019 Legislative session.

2011 Act 47 - Building Energy Disclosure Working Group

Act 47, passed in 2011, created a "Building Energy Disclosure Working Group" (BEDWG) to study "whether and how to require disclosure of the energy efficiency of commercial and residential buildings in order to make data on building energy performance visible in the marketplace for real property and inform the choices of those who may purchase or rent such property."

The BEDWG delivered a report to the General Assembly in December 2011¹ with the focus primarily on residential buildings and a recommendation for a requirement that property sellers provide disclosure of building energy performance, delivered through a mechanism such as an online tool with no cost to the end user, and tracked through a database of a form to be determined. The BEDWG also provided draft legislation for the recommendations. While the proposed legislation was considered during the 2012 legislative session, it was not adopted.

2012 - Thermal Efficiency Task Force

The PSD created and facilitated a 60+ person “Thermal Efficiency Task Force” (TETF) to “ensure an integrated and comprehensive statewide whole-building approach to thermal energy efficiency that will put Vermont on the path toward meeting the state building efficiency goals set forth in statute”. The taskforce finished its work and delivered its report to the General Assembly in early 2013.² The report made some specific recommendations regarding scoring and labeling, including the following:

“Make efficiency visible. Begin delivering a voluntary energy performance score or label to existing buildings in Vermont, then reevaluate after 3 years to determine whether labeling and disclosure should be phased in as a requirement at time of sale. Help increase the availability of building fuel use data so building owners and tenants can identify energy savings opportunities. These data will also enable buildings owners to benchmark their energy performance against other similar buildings and / or the building’s own historical energy consumption.”³

Creation of a working group to develop an “energy rating” to use in building disclosure was one of the TETF recommendations included in H. 520, which was enacted as Act 89.

2013 Act 89 - Building Energy Disclosure Working Groups & Report

The 2013 General Assembly passed thermal efficiency legislation, Act 89, with language that called for the creation of a Working Group to “develop a consistent format and presentation for an energy rating that an owner of a building may use to disclose the energy performance of the building or a unit within the building to another person, including a potential purchaser or occupant.” The Working Group was also charged with developing or selecting “one or more tools that can be used to generate the energy rating.” A report to the General Assembly was due December 15, 2013 on the Working Group findings on a *residential* disclosure tool and by December 15, 2014 on *commercial* disclosure tools.

The Residential Working Group recommended a multipronged approach that included the following four approaches:

- (1) Develop and make available a voluntary energy score and label that can be displayed within the MLS;
- (2) Describe the energy features of the home accurately in the MLS system;
- (3) Gather and provide previous utility bills as part of home rental, sales and purchases; and
- (4) Recognize energy efficiency program achievement with certifications that conform to national guidelines so that they may be included in the MLS, used with existing appraisal tools, and are meaningful to mortgage underwriters.

¹https://publicservice.vermont.gov/sites/dps/files/documents/Energy_Efficiency/BEDWG/BEDWGLegislativeReport_FINAL.PDF

² https://publicservice.vermont.gov/energy_efficiency/tetf

³ https://publicservice.vermont.gov/energy_efficiency/tetf, Report page ES-6

The Working Group also determined that no additional legislation was needed and that the implementation steps included in the report could be completed without legislative action.

The Commercial Working Group recommended that Vermont adopt a number of suggestions including the following:

- EPA's ENERGY STAR® Portfolio Manager ("ESPM") should be the primary tool used to benchmark buildings and generate an energy rating and label using operational energy consumption data;
- Aggregate energy use data should be provided through a mechanism that protects tenant privacy but allows for data access to facilitate benchmarking;
- An opt-out provision should be provided for tenants who do not want to make their energy use data available; and
- Engage and work with the private sector through EEU programs to deliver and implement benchmarking and labeling services to Vermont building owners and managers.

Residential Building Energy Labeling

Summary of Recommendations

Below is a summary of the Residential Working Group recommendations regarding building energy disclosure in Vermont. This summary focuses on the items that were required to be addressed in Act 62 and therefore does not include every recommendation or suggestion made in this report. Although the Residential Working Group is not recommending a mandatory approach, suggestions are made in certain areas of the report on what might be needed if an energy label were to be mandatory vs. voluntary.

Energy Label – Home Energy Profile

The "Vermont Home Energy Profile" (VHEP) is recommended to be used as the label to disclose single-family building energy information and to provide insight into a home's energy attributes as well as actionable next steps to further lower energy use. The VHEP will provide information on home characteristics (address, age, sq. ft.), estimated total energy use, estimated energy costs, energy highlights and features, steps to lower energy costs, and resources to assist homeowners with energy improvements.

The Residential Working Group recommends that the VHEP be made available for use on a voluntary basis, but also recommends that any municipalities that choose to require building energy disclosure use the VHEP to create consistency throughout the state on what information is included and displayed on a Vermont label. The Residential Working Group also recommends that the VHEP be created from the Energy Estimator, a customer-facing web tool developed by ClearlyEnergy and the Northeast Energy Efficiency Partnership (NEEP).

The Working Group further recommends that the energy usage and cost estimate displayed on the VHEP be derived from *asset-based* energy modeling. Asset-based energy models utilize home energy features such as size, age, heating equipment and insulation levels to provide annual energy estimates that are normalized for weather, occupancy, and behavior. Asset-based models augment historic utility bills which can vary significantly due to weather and occupancy behavior. See page 18-19 for further discussion of asset vs. operational energy information.

Reporting Requirements & System for Maintaining Information

The Residential Working Group is not recommending reporting requirements for building energy information beyond the state supported programs (EEUs and the State Office of Economic Opportunity, “OEO”) reporting weatherization program completions on a quarterly basis.

The Residential Working Group recommends that the HELIX Platform administered by NEEP be used as the system for maintaining building energy information. HELIX will provide the foundational database for maintaining VHEPs and related home energy information that is captured within the profile. Program data stored in HELIX will enable VHEP’s to be populated with program completion information. Upon creation of a VHEP, a URL link to the Profile PDF report will be stored in HELIX and made available to the MLS with homeowner consent.

Administration and Oversight

The Residential Working Group recommends that Efficiency Vermont, Vermont Gas, and Burlington Electric Department, as the state’s EEUs, collaborate to administer the work required under a voluntary labeling program and that the scope for the work should be consistent with the resources available to carry it out.

The Residential Working Group also recommends that an advisory committee be created to govern the delivery of the Vermont Home Energy Profile and to determine the overall roles and requirements for administration of a voluntary labeling program.

Public Disclosure of Information

The Residential Working Group recommends that all *asset-based* data about a home’s level of efficiency as generated by the Programs or the Energy Estimator, shall not be considered private if customers choose to make that information publicly available. HELIX should not store any Personally Identifiable Information (PII) such as customer name, actual utility usage, or cost data, except in cases where the customer has supplied this information and agreed to sharing the data. EEUs will not be supplying energy usage or cost information directly to HELIX. The Working Group further recommends that data entered into the Energy Estimator tool for the purpose of generating a label, also not be considered private. A checkbox or other acknowledgement should be incorporated into the platform that allows the homeowner to allow the information entered into the tool to be made public. The Working Group recommends that all EEUs and OEO implement program participation terms that identify final project completion data to be considered public. This data shall be limited to asset-based data elements and recognition of final project completion. No Personally Identifiable Information (PII) shall be shared or considered public.

Requirements and Training for Home Assessors

No credentials are required to use the Energy Estimator tool to generate a VHEP. However, if a building is to be listed as “professionally verified” and certified energy information is not available in HELIX, the Residential Working Group recommends that the profile be generated by a “Credentialed Professional”. The list of credentials that would qualify an assessor as a *Credentialed Professional* are on page 27 of this report.

The Energy Estimator tool is also designed to be usable by homeowners and assessors without technical training. However, as with any interactive technology, not all users will be able to successfully produce

an accurate VHEP without assistance, including Credentialed Professionals. Therefore, the Working Group recommends that online and in-person training for homeowners and professionals in the use of the Energy Estimator tool be offered by the program administrator(s) or their designee.

Recommendations to Increase the Impact of the VHEP

The Residential Working Group recommends that the EEs support building energy disclosure in their programs and in the real estate industry by using the Vermont Home Energy Profile to encourage investment in home energy efficiency and drive demand to higher-performing homes.

The Working Group also recommends that with appropriate funding, EEs should support municipalities that encourage the disclosure of the Vermont Home Energy Profile in the home buying, selling, and renting process.

The Residential Working Group recommends statewide education and outreach for home buyers, sellers, and the housing industry about the benefits of home energy labeling. Part of the education/outreach could be to provide and promote a public GIS map display of VHEPs.

Further details on these recommendations as well as some explanation for why they were made, and the budget required to implement them, are included in the remainder of this report.

Scope

The Residential Building Energy Labeling Working Group (Residential Working Group) focused on single family homes, adopting the definition used by the US Census Bureau⁴:

Single-Family Definition

The single-family statistics include fully detached, semidetached (semi-attached, side-by-side), row houses, and townhouses. In the case of attached units, each must be separated from the adjacent unit by a ground-to-roof wall in order to be classified as a single-family structure. Also, these units must not share heating/air-conditioning systems or utilities.

Units built one on top of another and those built side-by-side that do not have a ground-to-roof wall and/or have common facilities (i.e., attic, basement, heating plant, plumbing, etc.) are not included in the single-family statistics.

While multifamily homes fall outside of this definition and the group's purview, the Residential Working Group believes that the single-family approach could be adopted for small multifamily homes as well (e.g. duplexes or single-family homes converted into 2 to 4 apartments).

⁴ US Census Bureau, <https://www.census.gov/construction/charts/definitions/#s>

Label and Tool

Label Design and Content

The members of the Residential Working Group agreed that it was important for Vermont to have a consistent label that would be used to present building energy information. The Working Group also agreed that an effective energy label needs to strike the right balance of detail and simplicity. For the Vermont Home Energy Profile (VHEP) it was determined that the following sections are important to give the reader insight into a home's energy attributes as well as actionable next steps to further lower energy use:

- Home characteristics (address, age, sq. ft.)
- Estimated energy use and relative home efficiency
- Estimated energy cost
- Breakout of total energy use (ex. electricity, heating fuel)
- Energy highlights and features
- Next steps to lower energy costs
- Resources for assisting homeowners with energy improvements

The current iteration of the Vermont Home Energy Profile builds off the work of the 2013 Energy Labeling Working Group. In 2016-2017 a label was piloted based on the Department of Energy's (DOE) Home Energy Score (see Appendix C). The group conducted market testing to determine which aspects of the label customers found the most valuable. Elements that were important such as energy/cost relative to other homes (the "energy wedge" and table) and understanding next steps for energy improvements ("Take Action" and "Resources") were carried over to the new label.

Several additional features were added to the updated version of the profile. Real estate professionals expressed interest in seeing the actual energy bill amount listed on the VHEP if provided by the homeowner. This provides a reference point for a homeowner's actual energy cost and can be compared to the estimated cost that normalizes for weather conditions, number of home occupants, and thermostat set points (see more on this in the "Asset, Operational and Automated Energy Labels" section of this report).

The Working Group also added a reference to the entity creating the VHEP. The current labeling framework is designed for use by homeowners or energy professionals. If a label is generated using home energy information provided by a qualified professional, the label will display the words "Professionally Verified" to show that the label creator has professional knowledge of home energy features. Credentials for qualified professionals are referenced in a separate section of this report. If the label was generated with homeowner inputs, the label will display the words "Homeowner Verified" showing the owner completed inputs to the best of their knowledge. When a homeowner first enters the information into the tool to create a label, they will need to attest that the information they are entering is correct to the best of their knowledge. In a third scenario, a label could be generated using publicly available data from a source such as a tax assessor database, unmodified by a homeowner or professional. In this case the label would show "Unverified Estimate" to show that the estimate is based on data that has not been verified by someone familiar with the home's current energy features.

Figure 1: Example from Vermont Home Energy Profile:



One area that was discussed at length among the Residential Working Group was the ability to show multiple heating sources on the label. The majority of stakeholders felt it was important to show the impact a secondary fuel type has on energy use given the number of homes in Vermont with multiple heating sources (e.g., propane heat and wood stove, heat pump and oil). The ability to include multiple sources of heat was added to account for this. Additionally, if a home has solar, the impact of its energy generation will show up in the annual energy use and costs.

Figure 2: VHEP Page 1 (Front of Profile)

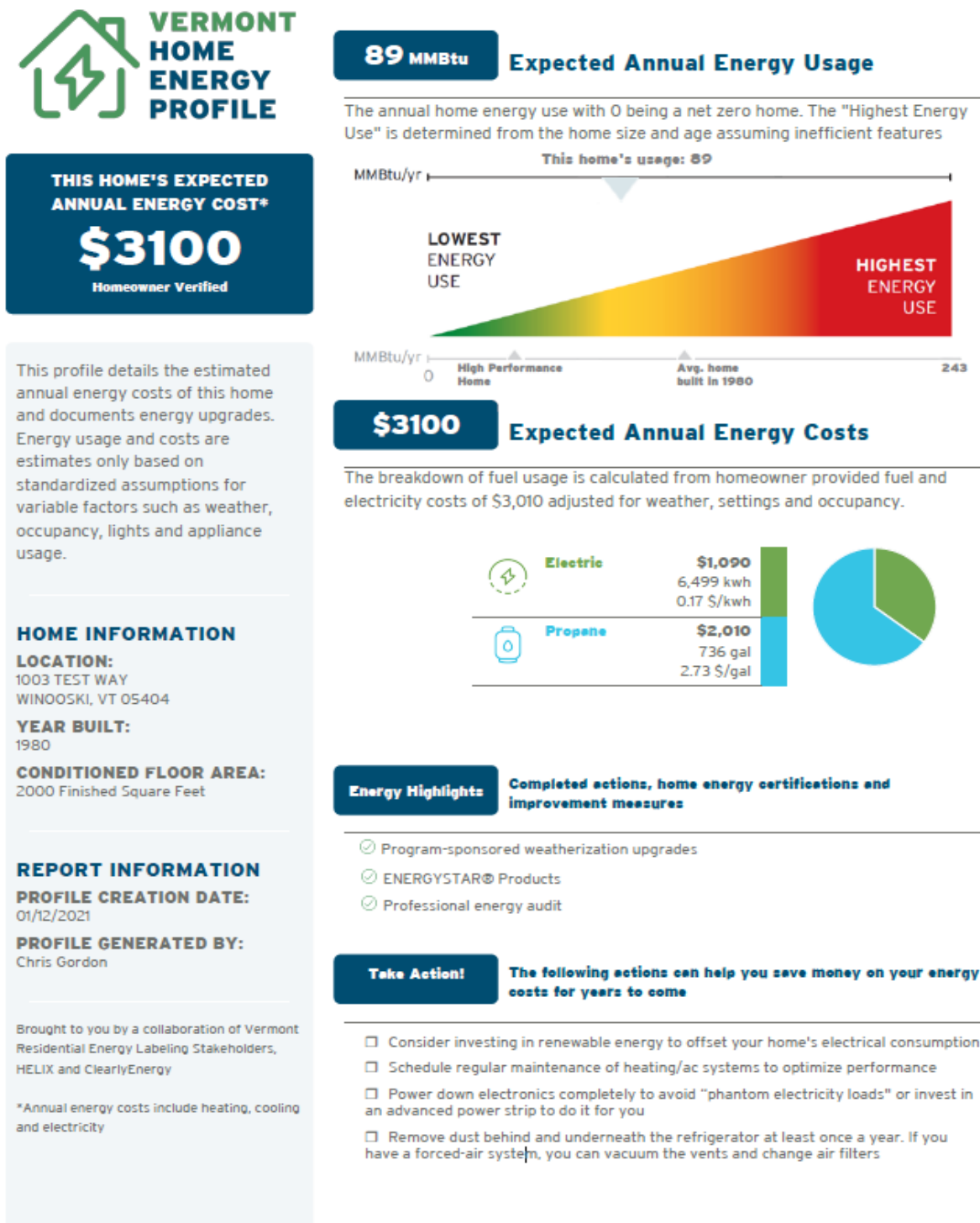
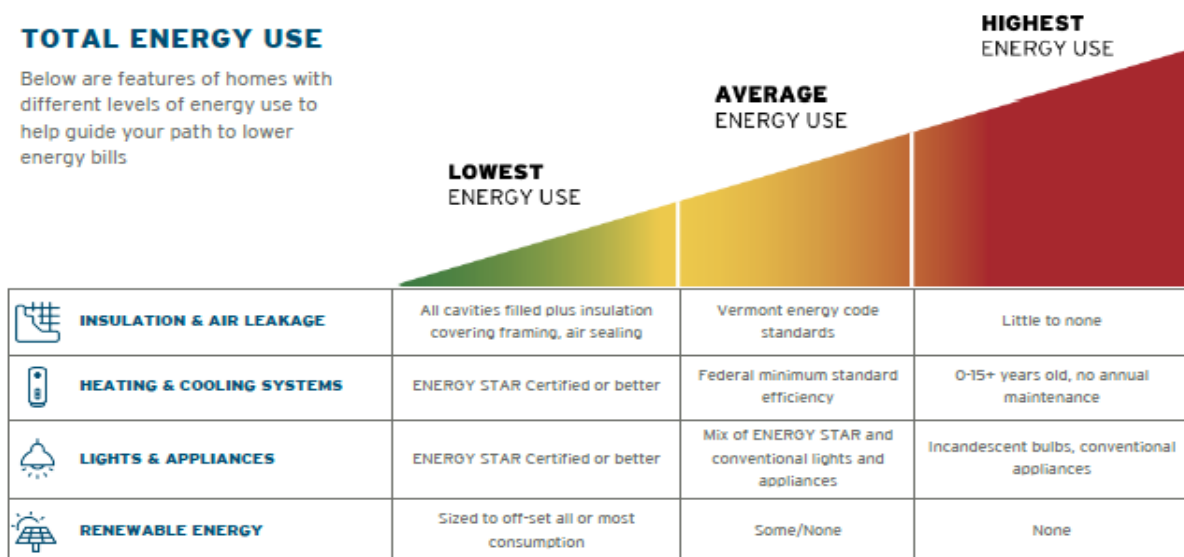


Figure 3: VHEP Page 2 (Back of Profile)



Expected Annual Energy Use

All sources of energy used in this home (electricity plus oil, gas, propane and/or wood) are converted to a common unit called MMBtu: one million British Thermal Units. A low MMBtu identifies a home as energy efficient with lower energy costs and a smaller carbon footprint.

1 MMBtu =

- 7 gal fuel oil
- 710 therms of natural gas
- 11 gal of propane
- 293 kWh of electricity
- .05 cords of wood

Average VT home referenced on pg. 1 is based on regional data from U.S. DOE

Additional Resources

Burlington Electric Department: www.burlingtonelectric.com

Drive Electric Vermont: www.driveelectricvt.com

Efficiency Vermont: www.efficiencyvermont.com

Go! Vermont: www.connectingcommuters.org

Renewable Energy Vermont: www.revermont.org

Vermont Energy Saver: www.energysaver.vermont.gov

Vermont Gas Systems www.vermontgas.com

Vermont Weatherization Program dcf.vermont.gov/benefits/weatherization

Vermont Energy Code publicservice.vermont.gov/energy_efficiency/rbes

Home Energy Labeling eXchange (HELIX) Energy Estimate

HELIX, sponsored by the Northeast Energy Efficiency Partnership, hosts third-party certified home energy data to be used by realtors and lenders to properly value energy efficiency. www.neep.org/home-energy-labeling-information-exchange-helix. Clearly Energy generates energy estimates based on homeowner inputs and publicly-available data (home age, size, heating system type and fuel) or an energy model from a professional who has visited the home. Standard assumptions are used for variable factors such as weather and occupancy. Average fuel prices are obtained from the U.S. Energy Information Administration and the VT Public Service Dept. Historic fuel bills can inform costs but are specific to prior occupancy and weather

The Residential Working Group recommends that the VHEP be made available for use on a voluntary basis, but also recommends that any municipalities that choose to require building energy disclosure use the VHEP. This will ensure consistency throughout the state on what information is included and displayed on a Vermont label. Additionally, the Working Group recommends that if a municipality is considering building energy disclosure requirements, they carefully examine whether those requirements may result in any new fees or costs to low-and-moderate income Vermonters. If it may result in additional costs to this population the Residential Working Group recommends that they

consider providing exemptions and/or financial assistance for income eligible sellers such those included in the City of Portland’s exemptions and waivers section for building energy disclosure.⁵

Energy Label Creation

One of the challenges in successfully bringing the previous Vermont Home Energy Profile into the marketplace was cost. A U.S. Department of Energy (DOE) approved Home Energy Assessor was required to produce the initial label, which cost approximately \$200. Once DOE grant funding covering labeling costs was depleted, most customers were not interested in paying to have an assessor come to their home to provide a Home Energy Score. Taking the lessons from the pilot, the new Vermont Home Energy Profile is designed as a low or no cost option for customers interested in seeing an overview of a home’s energy features and estimated annual costs. The current label is created from the Energy Estimator, a customer-facing web tool developed by [ClearlyEnergy](#) and the Northeast Energy Efficiency Partnership (NEEP)⁶. It provides a means of getting a snapshot of a home’s energy use, energy features, and recommendations for next steps based on the home features listed. A homeowner can then decide if they would like a more thorough home audit from a contractor or pursue projects on their own.

The Energy Estimator ties into NEEP’s Home Energy Labeling Information Exchange (HELIX) which serves as a data warehouse for residential energy information. Data stored in HELIX can be made available to populate green fields in the Multiple Listing Service (MLS), increasing the visibility of a home’s energy attributes. HELIX also provides data for the Vermont Home Energy Profile and similar labeling efforts in the northeast. If recent third-party professional certification (provided by the Energy Efficiency Utilities – Efficiency Vermont (“EVT”), Vermont Gas Systems (“VGS”), the City of Burlington Electric Department (“BED”), national certifying bodies (ex. LEED, Environmental Protection Agency, Department of Energy) or solar information exists in HELIX, it will automatically be pulled into the Energy Estimator tool and will provide a basis for the home’s energy use as well as population of the “Energy Highlights” section of the VHEP. Annual energy use and estimates can be overridden by the homeowner if they have data that more accurately represents the home’s current energy use, and the VHEP would then show that the estimate was “Homeowner Verified.” Certifications will still populate the ‘Energy Highlights’ section.

⁵ https://www.portlandoregon.gov/citycode/76074#cid_670179

⁶ NEEP’s *Home Energy Information Guide* with step-by-step instructions on how to use Energy Estimator to create a VT Home Energy Profile is available at:
https://publicservice.vermont.gov/energy_efficiency/buildingenergy_labeling

Figure 4: Labeling interface with HELIX.

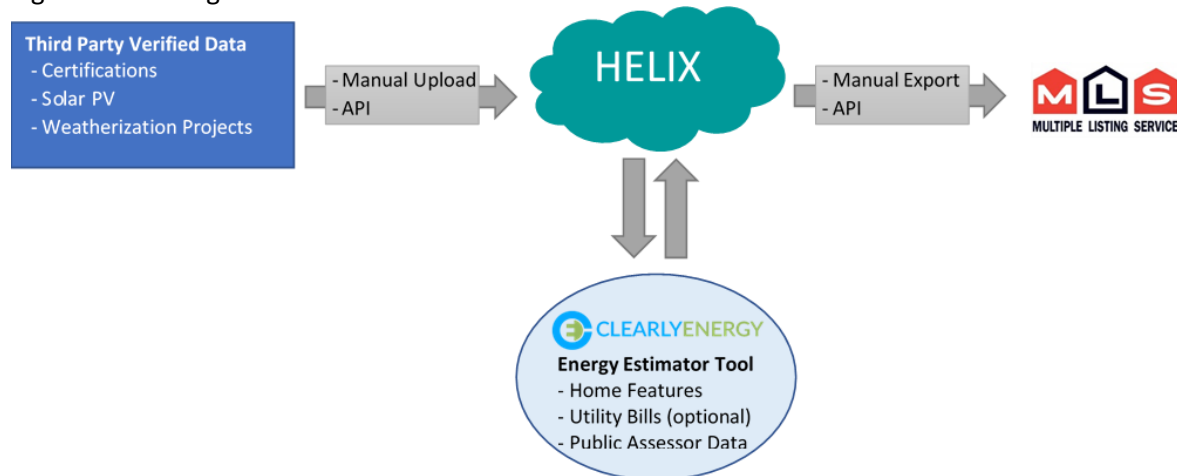


Image courtesy of NEEP: <https://neep.org/home-energy-labeling-information-exchange-helix>

If there is no energy data available for the home in HELIX, the Energy Estimator will see if public assessor data is available to provide an initial estimate based on home size, age, fuel type, and any other data that is publicly available. The homeowner also has the option of entering their annual energy bill information to provide a basis for an estimated annual energy cost. In all scenarios, the homeowner can modify home attributes in the Energy Estimator tool to reflect their actual home features, which the tool will take into account when determining the estimated energy costs.

Asset, Operational and Automated Energy Labels

The basis for estimating a home's energy use can be derived from multiple data sources including energy bills, public data, and energy modeling. Each of these sources has advantages and disadvantages further described below by the [National Association of State Energy Officials \(NASEO\)](#)⁷:

Operational:

Operational labels are “derived from actual energy consumption data through utility bills and/or delivered fuel records. These can be beneficial for encouraging efficient behavior by occupants of a home. By evaluating actual energy use, these scores can support the adjustment or continuation of energy-use habits over time. However, this type of score is less useful for comparing homes, as the actual energy use of a home will vary by occupants (e.g. a family of four with young children uses energy differently from the same home occupied by family of four with teenage children or occupied by a retired couple) and by weather (e.g. if the prior winter was exceptionally cold, or the summer exceptionally warm, it will have a large impact on the operational score).”

Asset-based:

“Asset-based building energy labels provide information about how a home is likely to perform based on a set of standard testing criteria. Just as an automobile's actual performance varies based on

Asset vs. Operational



✓ Asset

- ▶ Modeled energy performance
- ▶ Standardized for occupancy & weather
- ▶ Fixed over time

Operational

- ▶ Actual energy usage
- ▶ Dependent on occupancy & weather
- ▶ Changes over time



⁷ <https://empress.naseo.org/home-energy-labeling-tools>

maintenance, driver behavior, or weight of cargo (i.e., "your mileage may vary"), a home's energy performance will vary based on maintenance, occupant behavior, the number of residents, and actual weather as opposed to average weather.

"Asset scores evaluate only the physical assets of the home -- insulation, HVAC and water heating equipment, home envelope, duct sealing, etc. They do not evaluate the operational aspects of the home -- i.e. whether a home has two residents or four, if the thermostat is set to 70 or 75 in the summer, etc. Asset scores apply the same set of behavioral assumptions to the home regardless of the current occupants. Applying a common set of assumptions and evaluating only the physical assets protects resident privacy, allows comparison of different homes, and produces a durable score that remains valid through a change of ownership of the home. The only way to change a home's asset-based score is to change the home's energy-related systems (HVAC, hot water, envelope, etc.)."

Automated:

Automated labeling is based on publicly available data and "offer[s] a mechanism to provide a high volume of data at low cost compared to on-site verified asset-based scores and may offer a path to raising awareness of energy performance among homeowners, buyers and sellers. When utilized in real estate portals, automated scores are often published as 'unverified' and provide a home buyer or seller with an opportunity to connect with a third-party provider to verify or update their score."

The Vermont Home Energy Profile, in its current iteration, is primarily a consistent format and framework for sharing available energy information about a home in a low/no cost manner to the homeowner. When no information is available, either through HELIX or the homeowner, public records are utilized to generate an automated asset-based energy estimate. When a homeowner, or their designee, provides home energy feature data to the ClearlyEnergy tool or program data is available through HELIX, an asset-based energy estimate is generated. The asset-based energy estimate can also be calibrated with energy bills for the final energy estimate. This approach, different from the 2016-17 efforts, allows an energy estimate to be created for every home in a low-cost way without scheduling a time- and sometimes resource-intensive audit. Ideally, this estimate will be the first step and will prompt the homeowner to take action and perform energy improvements through the available programs.

As noted above, one of the primary benefits of asset-based labeling is its focus on home features and standard assumptions for average annual temperatures, occupancy, and thermostat settings. Occupant behavior and annual weather variations can have a significant impact on energy use. Analysis using REM/Rate modeling software shows that a five-degree difference in winter thermostat setting can impact a home's total energy bill by approximately 10%. In looking at annual weather variation, a warmer than average winter (as determined by a ~15% decrease in heating degree days) can result in a 6-7% decrease in energy use. The Energy Estimator tool works to "normalize" these factors by using averages that align with typical thermostat set points and weather conditions for a specific location.

Rocky Mountain Institute conducted a study in 2018 titled "An MPG for Homes⁸" that compares energy estimates from two automated modeling tools to the DOE Home Energy Score estimate. ClearlyEnergy's Energy Estimator was one of two modeling tools in the study. The research shows that automated modeling using basic inputs such as home age, size, fuel type, and location can result in a home energy

⁸ Rocky Mountain Institute, 2018: http://rmi.org/wp-content/uploads/2018/05/MPG-For-Homes_HomeEnergyEstimates_Report_FINAL2.pdf

use estimate within +/- 20-30% of the DOE Home Energy Score output, created by a professional energy assessor. When the Energy Estimator's ability for a homeowner to modify inputs is factored in, it brings the estimate closer to actual usage. Testing for the Vermont-based version of the Energy Estimator has shown that when inputs are updated to reflect the current-state attributes of a home the average energy cost estimate lands within +/- 5-15% of actual energy bills. Rocky Mountain Institute concludes that, *"the existence of reasonably accurate 'first look' energy performance estimates...cannot only start the conversation for more homeowners, but can also motivate them to take the next step—whether that means pursuing a more comprehensive on-site assessment, ... purchasing [a] more efficient home, or installing valuable energy upgrades themselves."*⁹

Although there was general consensus in the Residential Working Group on the use of VHEP and the Energy Estimator tool for building energy disclosure in Vermont, there were some members that questioned the accuracy of homeowner inputted information and the value for costs. Part of the sentiment was that the time and money required to support building energy disclosure has a symbiotic relationship to the value the program will likely yield. In earlier program concepts, which were evaluated primarily within the context of a "professional services needed framework" (that professionals would need to gather the building energy data and/or conduct a building energy assessment), many viewed the time and costs as too high compared to the potential benefits. Yet, there was also a concern that a lower cost program, which utilizes homeowner self-disclosures, may decrease the value of the information provided, potentially to the point where it is no more valuable than the energy information already being disclosed during most typical real estate transactions.

The Residential Working Group recommends that the Energy Estimator tool be continually tested and improved to increase its accuracy and ease of use. Additionally, it is important to clarify that this approach does not preclude the use of a professionally verified rating or certification. The recommended framework allows for a consistent label to be generated using homeowner provided data, third party certified data (e.g. EEU or weatherization program), or a combination of the two.

Rating Score and Reporting

This section will address the Residential Working Group recommendations for the following: reporting requirements for building energy information; the system for maintaining such information; administration of the VHEP and tool; protocols with respect to data, confidentiality requirements, appeals process/recourse to challenge the results; and public access to labeled building results.

Reporting Requirements

Reporting of the VHEPs will be accomplished using the data stored within the database used to generate the profile, as well as storage of the profile itself. Specific reporting elements include but are not limited to:

- URL link to the Vermont Home Energy Profile PDF report
- Third-party certifications and/or ratings
- Program-sponsored weatherization completion verification
- Solar PV data

⁹ http://rmi.org/wp-content/uploads/2018/05/MPG-For-Homes_HomeEnergyEstimates_Report_FINAL2.pdf

Detailed home feature data that is self-reported and generated within the ClearlyEnergy - Energy Estimator tool is not currently stored in HELIX. The Residential Working Group recommends that energy use and cost metrics generated by the tool should be stored as 'Measurements' attached to the Profile in HELIX. If desired, user inputs can be stored in aggregate in the HELIX 'extra data' field. This data would be unstructured and encoded. These changes can be implemented without additional development cost. If a field structure is desired to store input data, this will require additional development and associated costs. The Residential Working Group further recommends that the Advisory Committee (described on page 24) investigate these potential development costs for storing detailed home feature data and model assumptions used by the Energy Estimator in HELIX. If any of these additional data points are stored within HELIX they should be identified as Professionally or Homeowner Verified.

The Working Group recommends a phased approach to reporting requirements for third-party certifications and program sponsored weatherization project completion verification. Phase 1 should apply to Single Family homes only, including stand-alone dwellings and attached townhouse dwellings. Phase 1 will also be limited to projects completed through the Energy Efficiency Utilities (EEUs) and the Weatherization Assistance Program (WAP) administered by the Vermont Office of Economic Opportunity (OEO). The Working Group recommends that all weatherization programs use a standard "State/Efficiency Program" designation such that OEO funded projects are not identified as low-income projects. If a homeowner chooses to list the actual program sponsor in their listing they can opt to do so. Reporting will be limited to final certification or rating data for new construction homes and completed 'comprehensive thermal retrofit projects' for existing homes. A 'comprehensive thermal retrofit is defined as follows:

The term "comprehensive" ... means a project that includes the most cost-effective thermal efficiency measures identified through a professional energy audit, which in practice will include thermal shell improvements (air sealing and insulation).¹⁰

Data should be reported by the program implementer (i.e. EEUs and OEO) on a quarterly basis at a minimum. Projects that span multiple months will be overwritten by the latest quarterly reporting data. Projects that span multiple years will be reported as a separate project associated with the completion date of the reporting year.

Specific data elements uploaded to HELIX should include, but not be limited to:

- Customer address
- Name or title of certification or completed project [Assessment Type]
- Score or rating, if applicable, associated with the Assessment Type
- Version of the Assessment Type if applicable (used to identify program requirements)
- Date of project completion
- Annual claimed energy savings, if available
- Annual claimed energy cost savings, if available
- Annual estimated energy use, if available
- Annual estimated energy cost, if available
- Estimated percent fuel use reduction, if available

¹⁰ Vermont Public Utility Commission report, Annual Report of the Department of Public Service On Vermont's Progress Toward Building Energy Goals Pursuant to 10 V.S.A. § 581, December 27, 2018.

Annual estimated energy costs and savings may be based on contractor audit data or deemed savings from the EEU Technical Resource Manual (TRM). Quarterly data reporting will be limited to the Energy Efficiency Utilities - EVT, VGS, BED, and the WAP administered by OEO.

There were concerns raised by some Working Group members that the publicly funded programs (EEUs and OEO) would incur new reporting requirements with additional costs that are not accounted for in their existing budgets. In addition, that this could be perceived as adding a layer of administrative burden to a program that is already accomplishing a primary goal of building energy disclosure – to make buildings more energy efficient. It was also pointed out that if a primary goal is to increase the energy efficiency of buildings this initiative is an indirect way of investing in that end-goal and more direct investment opportunities exist.

System for Maintaining Scores and Information

The Residential Working Group recommends the HELIX Platform,¹¹ administered by NEEP as the foundational database for maintaining VHEPs and related home energy information that is captured within the profile. The HELIX database was developed through a U.S. DOE grant to store and auto-populate Multiple Listing Service (MLS) databases with residential building energy information. HELIX is built upon the U.S. DOE Standard Energy Efficiency Data (SEED) platform¹². SEED was originally developed in response to benchmarking ordinances to store and manage energy performance data for commercial buildings. In the event that HELIX support is discontinued by NEEP, or SEED by the U.S. DOE, all data can be downloaded and stored in a Comma separated values (CSV), Microsoft Excel, or JavaScript Object Notation (JSON) file.

There are annual maintenance and support costs for utilizing HELIX. These costs, and who is paying for them, will need to be considered for ongoing use of HELIX. Vermont's annual maintenance and support fees for the use of the HELIX database and MLS connection are currently \$10,000. Annual costs for the Energy Estimator tool used to generate the VHEP are \$7,000. If further development beyond the current functionality of HELIX or the Energy Estimator tool is desired, there would be additional costs for that development. This \$10,000 annual fee for HELIX has been paid by Efficiency Vermont for the first year of use, 2020. Initial Energy Estimator development costs have been covered by a U.S. Department of Energy grant¹³.

The Working Group recommends a cost sharing agreement with NEEP and ClearlyEnergy across all organizations (EEUs, municipalities) utilizing HELIX and the ClearlyEnergy-Energy Estimator Platform. The Working Group further recommends that any municipalities that establish an ordinance mandating energy labels share a portion of the annual software platform costs.

An additional consideration with use of the expanded HELIX-ClearlyEnergy platform is that ClearlyEnergy is a private entity which creates uncertainties associated with costs and longevity, in addition to the proprietary nature of data and systems developed by ClearlyEnergy that are layered on top of the open-source SEED platform.

¹¹ <https://helix.neep.org/>

¹² <https://www.energy.gov/eere/buildings/standard-energy-efficiency-data-seed-platform>

¹³ U.S. Department of Energy Funding Opportunity Announcement DOE-FOA-0001222 issued on January 20, 2015

Field Testing of Data Collection and Transfer Systems

The Residential Working Group recommends that program implementers (EEUs and OEO) upload project completion data on a quarterly basis, as defined in the Reporting requirements section above, to HELIX. Field testing of data collection is not required beyond the existing requirements established by the entity responsible for issuing the final project completion data. Data uploaded to HELIX and utilized in the VHEP is considered ‘third-party verified’. Data entered into the ClearlyEnergy Energy Estimator tool by a homeowner and used to generate a profile should be clearly documented as ‘homeowner verified’ and not require further testing or verification.

Appeals Process, Recourse to Challenge Results

The Residential Working Group discussed whether an appeals process would be necessary, particularly if the VHEP was generated by someone other than the homeowner. The Working Group determined that an appeals process is not necessary when a homeowner generates the Profile. In these cases, the Working Group recommends providing language on the VHEP that the information used to generate the Profile was supplied by the homeowner to the best of their knowledge, similar to disclaimer language utilized in the Seller’s Property Information Report (SPIR)¹⁴. In cases where the Energy Estimate reported on the Profile is derived from an underlying rating or certification, an appeal would follow the process designated by the entity administering and issuing that certification or rating. In a mandatory program, any appeals process would be defined by the jurisdiction.

In cases where an energy professional completes the VHEP on behalf of the homeowner, the professional should be required to identify qualifying credentials, as recommended in the Home Energy Assessor section of this report, proving their active status as an energy professional.

Administration, Implementation and Overall Entity in Charge

Under a voluntary labeling program, it is recommended that Efficiency Vermont, Vermont Gas, and Burlington Electric Department as the state’s EEUs, collaborate to administer this work. There are costs associated with implementing a voluntary labeling program that are not directly tied to immediate savings. This will need to be considered when establishing the budget and goals of this work. If support of this work leads to the recognition of energy savings, it is possible that the EEUs could support such a program in the future through resource acquisition activities. For now, the effort is funded through the Development and Support Service (DSS) budgets. In any case, the scope for the program should be consistent with the resources available to carry it out.

If jurisdictions opt to establish a mandatory labeling program, that jurisdiction shall be responsible for oversight, administration, reporting and compliance enforcement. In a mandatory context the Administrator(s) will be responsible only for ensuring the data and systems are in place to allow for generation and long-term storage of the label in the HELIX database. In the event that a jurisdiction requires data, reporting, or system features outside of what the current HELIX Platform offers, that jurisdiction shall be responsible for development oversight and any development costs incurred. If statewide labeling is mandated, the advisory committee described on the next page will need to consider who the appropriate entity is to administer and support the labeling requirements.

¹⁴ <https://eforms.com/images/2018/07/Vermont-Sellers-Property-Information-Report.pdf>

The Residential Working Group recommends that an advisory committee be created to govern the delivery of the Vermont Home Energy Profile and determine the overall roles and requirements for administration of a voluntary labeling program. The advisory committee should include representatives from the following organizations:

- Department of Public Service
- Energy Efficiency Utilities:
 - Efficiency Vermont
 - Vermont Gas Systems
 - Burlington Electric Department
- Office of Economic Opportunity/Weatherization Assistance Program
- Other interested stakeholders such as representatives from the real estate, energy efficiency, consumer advocate and lending industries

This committee should meet regularly to review implementation plans and progress, collect stakeholder input, approve changes, and provide ongoing guidance on program improvement. The Administrator(s) will identify issues requiring guidance from the advisory committee.

As noted above, it is recommended that the advisory committee determine the final roles and responsibilities of the Administrator(s) of a voluntary labeling program. At a minimum, the Administrator(s) role should include the following responsibilities to ensure a consistent, statewide approach to energy labeling in Vermont:

- Coordinate with NEEP and ClearlyEnergy as needed on procurement, configuration, maintenance, and updates to the platform utilized to generate and store home energy labels;
- Establish and monitor success metrics to determine efficacy of the labeling framework;
- Oversee the program website;
- Serve as a resource to answer Vermonters' questions about the energy label;
- Provide for training and support to stakeholders such as homeowners, energy contractors and professionals, real estate agents, appraisers, and lenders; and
- Provide statewide aggregate labeling completion reports as requested.

Customer and Technical Support

The Residential Working Group recommends that an entity with designated Customer Support staff be the primary contact to field questions related to the label. The Customer Support provider may refer inquiries to other organizations such as ClearlyEnergy as needed but will act as the primary interface for the customer. If uptake of the Profile grows significantly, Efficiency Vermont will need to reconsider this role and/or require additional funding specifically for this support.

Customer support will be provided in the following areas:

- Technical problems generating the VHEP
- How to enter energy information into the Energy Estimator
- Transfer of certifications into the MLS

In the case of a local mandatory labeling ordinance, questions related to that ordinance, compliance and reporting etc. should be directed to the program administrator for that jurisdiction.

The advisory committee should determine the best method of communicating this support to stakeholders. At a minimum Efficiency Vermont will provide an email address and phone number on its website. The Working Group recommends investigating development of a support routing function with the Energy Estimator tool.

Any technical support required to satisfy the quarterly reporting requirements by the EEU's and OEO should be directed to NEEP.

HELIX Access & Data Protocols

Access to data stored within HELIX shall follow the governance and data security protocols as established by the HELIX project team under the U.S. DOE Grant DE-FOA-0001222¹⁵. HELIX utilizes the native user access and security protocols developed for the SEED platform¹⁶.

The Residential Working Group recommends that all *asset-based* data about a home's level of efficiency as generated by the program or the Energy Estimator, shall not be considered private if homeowner or customer permission has been granted.¹⁷ Examples include record of project completion or certification, estimated annual energy use or cost as generated by the asset modeling tool. This data may be accessed or viewed across EEU's. HELIX should not store any Personally Identifiable Information (PII) such as customer name, actual utility usage or cost data except in cases where the customer has supplied this information and agreed to sharing the data in HELIX. In all cases, EEU's will not be supplying energy usage or cost information directly to the HELIX-platform.

The Working Group further recommends that data entered into the Energy Estimator tool for the purpose of generating a label, also not be considered private if homeowner permission has been granted. A checkbox or other acknowledgement should be incorporated into the Energy Estimator tool that allows the homeowner to accept that information entered into the tool will be considered public. Language utilized for this purpose should draw from clause language utilized by real estate professionals for seller completion of the Seller's Property Information Report (SPIR). The acceptance should be included early in the process of completing the Energy Estimator tool so that homeowners are aware of the public nature of the data prior to completing the energy profile.

Public Access to Labeled Building Results

The Working Group recommends that all EEUs and OEO implement program participation terms that identify which final project data will be considered public. This data shall be limited to asset-based data elements and recognition of final project completion. No Personally Identifiable Information (PII) shall be shared or considered public. For example, Efficiency Vermont's current terms¹⁸ read as follows:

The customer hereby authorizes Efficiency Vermont to release information relating to this project, such as home address, energy efficient home features installed, and certifications, ratings, and/or labels obtained, for the purpose of assisting real estate appraisers and realtors in

¹⁵ The HELIX governance and data security protocols are available at:

https://publicservice.vermont.gov/energy_efficiency/buildingenergy_labeling

¹⁶ <http://seedinfo.lbl.gov/W>

¹⁷ VT Law School drafted a memo to NEEP on data privacy concerns for the U.S. DOE HELIX project that is available at: https://publicservice.vermont.gov/energy_efficiency/buildingenergy_labeling

¹⁸ <https://www.efficiencyvermont.com/terms>

the development of accurate home appraisals and real estate listings. This release authorizes Efficiency Vermont to make such information publicly available, such as in public real estate listings or labels that display home energy efficiency characteristics.

The Working Group acknowledges that there will be costs associated with creating and implementing the data transfer to HELIX on a quarterly basis. Those costs will need to be estimated by each EEU and OEO prior to implementation of data transfer.

Sharing of EEU and OEO program completion data will enable population of HELIX and generation of labels. Programs should consider methods to enable retroactive sharing of data so that the label generation software has access to project data prior to the establishment of terms specifically enabling the sharing of data.

The Residential Working Group recommends that an opt-in provision be included at the beginning of the labeling process (in the tool) that a homeowner would either select, or allow for an opt-out, for sharing the other home data in the Profile on the MLS.

Home Energy Assessors

This section addresses the Residential Working Group recommendations on requirements for home assessors, including any endorsements, licensure, bonding, and credentials to professionally verify a VHEP; and programs to train home energy assessors.

The findings and recommendations assume providing building energy information to create a VHEP is voluntary. However, given that municipalities and local governments may implement mandatory building energy disclosure ordinances if they choose to, potential requirements for a mandatory program will be noted as necessary.

This section also assumes that the Vermont Home Energy Profile will be adopted as the label for Vermont. The profile will not be listed as “professionally verified” unless created or reviewed by a Credentialed Professional. Any label used for compliance with a mandatory energy labeling program with legal or financial implications, may want to consider it being professionally verified.

Requirements for Building Assessors Including Endorsements, Licensure and Bonding

The role, necessary training and required credentials of building assessors will depend on the nature of the building energy disclosure requirements. Specifically, the training and credentialing of building assessors may need to be more stringent for a mandatory program as opposed to a voluntary program.

As described above, the Residential Working Group has proposed using the Energy Estimator to generate the VHEP. No credentials are required to use the Energy Estimator tool to generate a profile. However, if a building is to be listed as “professionally verified”, the label should be generated by a Credentialed Professional.

If any jurisdiction were to adopt a mandatory energy labeling program with legal or financial implications, there should be a process to establish when results need to be certified by a Credentialed Professional.

The Working Group has developed the following list of credentials that would qualify an assessor as a *Credentialed Professional*, authorized to professionally verify a Home Energy Profile:

- a. BPI – Energy Auditor, Envelope Professional, Building Analyst or at minimum, Building Science Principles (BSP) Certificate of Knowledge
- b. RESNET Home Energy Rater
- c. Passive House: PHIUS/PHI Certified Passive House Consultant or Passive House Certified Builder
- d. ASHI or NIBI Certified Home Inspectors
- e. IACHI: Home Energy Inspector
- f. CLEAResult: Building Science Basics Certificate
- g. Licensed HVAC Professionals*
- h. Professional Engineers (P.E.)
- i. VBRA members with Green Building Certificate
- j. Registered Architects
- k. LEED Certification, LEED Green Rater, LEED GA, or LEED AP
- l. National Association of Realtors Green Designation*
- m. DOE Home Energy Assessors
- n. National Green Building Standard Verifier
- o. AEE Certified Energy Manager (CEM) or Certified Energy Auditor (CEA)

* may need additional training in basic building science or home energy modeling to qualify

Assuming a voluntary energy labeling program, the Residential Working Group does not believe licensure and bonding mechanisms are necessary for Credentialed Professionals. However, for a mandatory program where compliance carries legal or financial implications, certification or licensing of Credentialed Professionals may be necessary. The requirements for licensure, insurance and bonding would need to be evaluated and customized based on the governing statute or ordinance.

In cases where a Credentialed Professional creates a VHEP for the homeowner, that professional's name, business or organizational affiliation can be listed on the VHEP at the discretion of the Credentialed Professional.

Programs to Train Home Energy Assessors

The Energy Estimator tool is designed to be usable by homeowners and assessors without technical training. However, as with any interactive technology, not all users will be able to successfully produce an accurate VHEP without assistance, including Credentialed Professionals. Many users will be able to complete a profile without assistance or with the help of the Technical Resource Call Center described in the Rating Score and Reporting section, above. Some users may require additional training on the use of the tool, which may be provided most cost-effectively through online videos or live webinars.

For a mandatory energy labeling program with legal or financial implications, training protocols may be more rigorous and technical for Credentialed Professionals who will have the authority to “professionally verify” a Profile.

The Working Group recommends that online and in-person training for homeowners and professionals in the use of the Energy Estimator tool be offered by the program administrator. Training may be offered through either online or in-person format and may include rudimentary instruction in building energy modeling or building science. Municipalities that adopt a local home energy labeling ordinance

should, whenever possible, align their program requirements with these statewide training opportunities.

Quality Assurance Provider

The qualifications of a Quality Assurance (QA) provider should be the same or more rigorous than those for a Credentialed Professional. QA services could be provided by the statewide program administrator(s), the third-party entity that provides training and technical resources or other organizations as required by local jurisdictions. The QA provider will need to be distinct from any evaluation service provider to maintain objectivity and allow for real-time communication with the program administrator. For mandatory programs, the jurisdiction should consider implementing a standardized QA process.

History of Vermont's Energy Rating and Labeling Activities

This section includes an overview of some of Vermont's experience with energy rating and labeling activities. Further details are included in Appendices B and C.

Asset Rating for New Homes

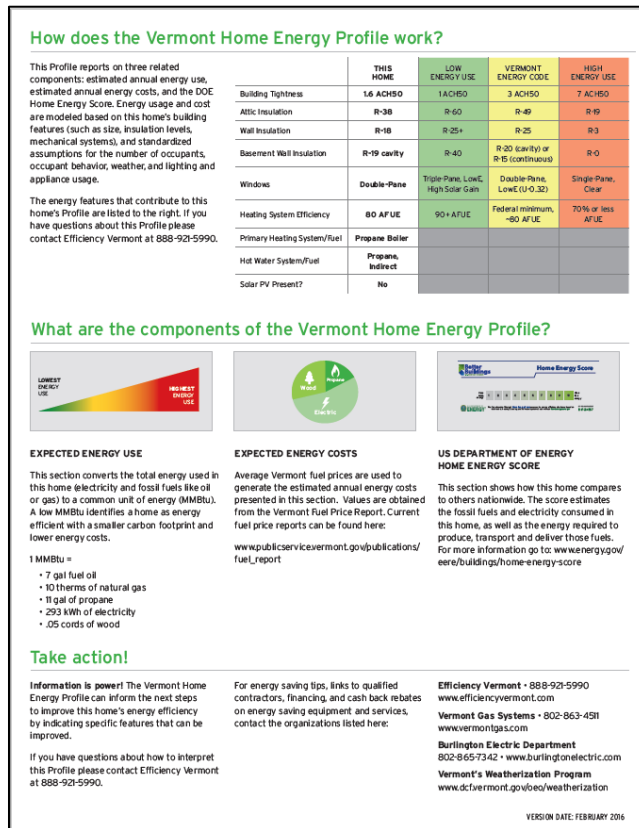
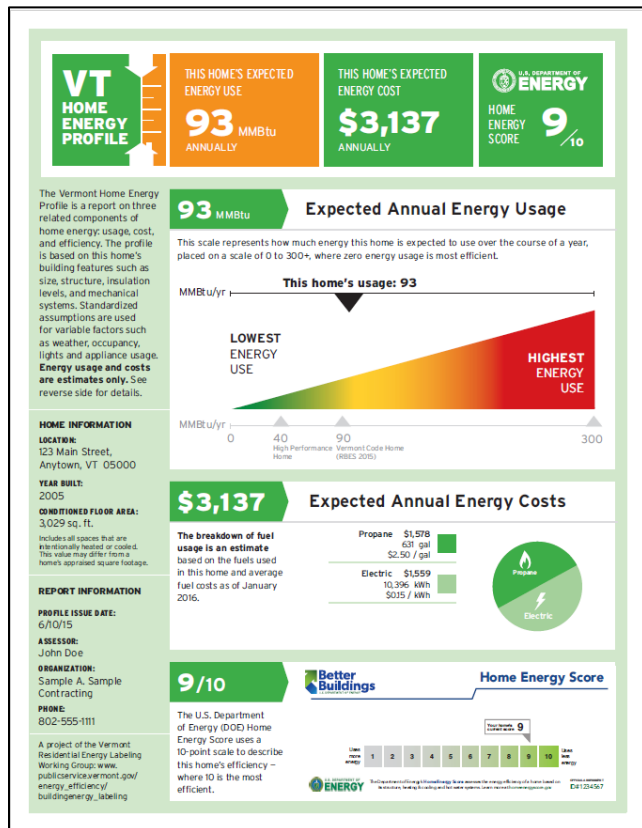
An early example of home energy labeling that is still in existence today is the Home Energy Rating System (HERS) index. Primarily used to determine the energy efficiency of newly built homes, the HERS index has been a part of residential new construction programs since the late 1990's.

A Home Energy Rating Score (HERS) compares the rated home to itself built to the specifications of the International Energy Conservation Code (IECC). A home built to the minimum IECC specifications (the Reference Home) has a HERS Index of 100 points. The high end of the Score is open ended for less efficient homes that use more energy than a code home. HERS designates zero energy homes with a Score of 0. Homes that produce more energy than they consume show a negative HERS Index Score. HERS is one of the methods that can be used to demonstrate compliance with the Vermont Residential Building Energy Standards (RBES).

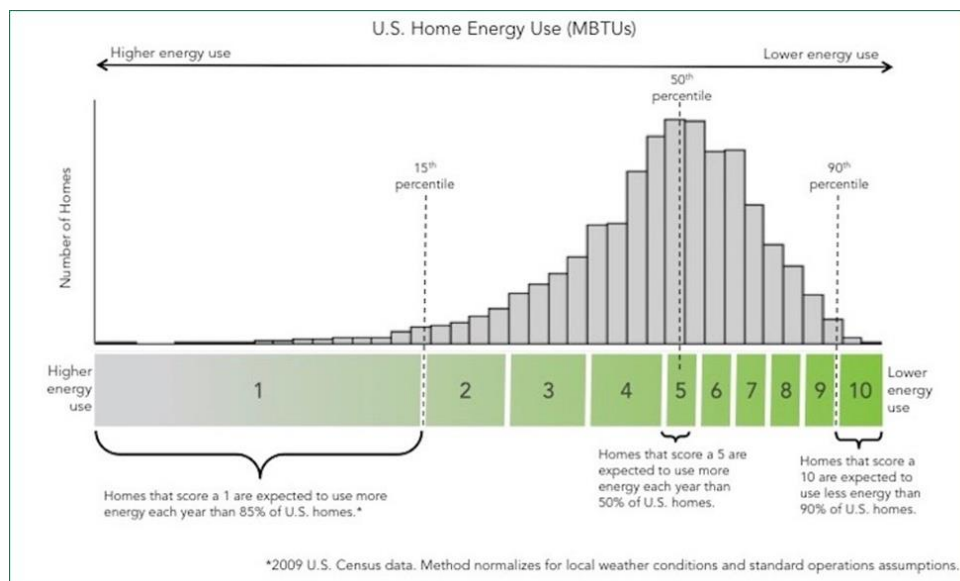
Asset Rating History for Existing Homes

Under legislative directives, a group of stakeholders was convened in 2013 as the Residential Energy Labeling Working Group to consider building energy labels for existing homes. This group reviewed extensive market outreach and worked to create a prototype existing home energy asset rating energy label called the Vermont Home Energy Profile – "Profile".

The Profile's rating scale (Pilot program version shown below), like the HERS Index used with new construction, had lower ratings associated with less energy use.



The U.S. Department of Energy began promoting their Home Energy Score (HES) around 2011 (see below). HES scores use a ten-point scale where 10 is most energy efficient and 1 is least energy efficient, the opposite of the HERS Index Score and the Vermont Home Energy Profile. After market testing it was decided to include the HES in the Profile.



A Pilot study was developed and implemented by Efficiency Vermont in collaboration with the U.S. DOE and the Residential Energy Labeling Working Group. The goals¹⁹ were to:

- complete 200 Profiles/HES;
- test the Profile's value in engaging customers;
- test whether an Assessor incentive was needed and what amount would be appropriate to attract Home Performance Contractors, Realtors®, and Home Inspectors as Assessors; and
- evaluate the accuracy and practicality of the DOE HES software with Vermont's climate and housing stock.

There were 261 Profiles and HES delivered as part of this pilot; 202 Profiles during the period where they were incentivized at \$200 for each initial site visit and \$50 for each final site visit (post upgrade). There were 18 "Assessors" trained to meet U.S. DOE's Assessor criteria, most were Building Performance Institute (BPI) certified home performance contractors. There were 12 Quality Assurance visits completed.

Ultimately, a decision was reached to cease use of the U.S. DOE's Home Energy Score in the profile for the following reasons:

- assessor training proved to be more than home inspectors and Realtors® were comfortable performing;
- while the DOE HES software did a good job of estimating energy use, the actual Home Energy Scores often didn't show much change after significant energy efficiency improvements were made; a frustration for owners and home performance contractors and an impediment to stimulating interest and
- the DOE HES software had difficulty with wood heat, homes with multiple fuels, and other regionally specific energy efficiency measures and modeling parameters (e.g., cold climate heat pumps, and electrical source energy characteristics, etc.).

Additional information on the pilot study can be found in Appendix C.

Other Energy Information Dissemination Initiatives in Vermont

Vermont Association of Realtors Initiatives

VAR Sellers Property Information Report (SPIR) & Utility Fact Sheet:

Although not required in the State of Vermont, the SPIR is an important tool used by most Realtors as part of a listing. In it, the seller has the opportunity to disclose what they know about the property they are selling. There is a utility section that could (and probably will) be updated by the VAR Forms Committee when they update the document.

The Utility Form has many versions created by each real estate office. Buyers like this form as a quick reference when studying the property and just before closing to know who to contact to open accounts prior to closing.

Members of the Residential Working Group developed a new updated comprehensive Utility Form for the VAR Forms Committee. However, the Committee did not adopt the revised form due to concerns about too many "don't knows" being selected by sellers, which could raise red flags by buyers. The

¹⁹ Source: Efficiency Vermont – Vermont Home Energy Profile Pilot: Results & Next Steps

Forms Committee members also stated that if a home had green features, their listing agent could include those features in the MLS green fields or comment areas.

VAR Energy Information Pamphlet:

Vermont Realtors have supported providing energy information to buyers as a simple way to address questions and concerns about energy costs and options for energy improvements and VAR leadership agreed to require its members to provide a two-page, Vermont “Home Energy Information Pamphlet” to home buyers, as part of the Purchase and Sales Agreement process.

The pamphlet provides general home energy information to buyers including:

- typical Vermont energy costs,
- the *Vermont Home Energy Profile* assessment service, and
- resources for next steps and home energy upgrades.

As July 1, 2017 Vermont Realtors® forms include a checkbox reminding Realtors to provide the *Home Energy Information Pamphlet* as a routine part of the Purchase and Sales Agreement process. The Pamphlet is available in the Realtors online form library. VAR notification to general membership went out June 9, 2017 and brokers were notified of the new form changes prior to that. It was hoped that the Pamphlet’s use would encourage more buyers to consider energy efficiency improvements at time of sale. The EEU’s will work with the VAR to update this pamphlet based on the recommendations in this report.

Distribution of the *Home Energy Information Pamphlet* (pictured below) is required of VAR members as part of the Purchase and Sales Agreement process.

How will your new home use energy?

Home Energy Information

Your home is a system, and understanding how it consumes all types of energy (like electricity, wood, oil, or natural gas), can help you determine how energy-efficient it is, and how much your monthly energy bills will be.

On average, Vermonters spend over \$3,000 on their energy bills every year, but once you know how your home uses energy, you can tackle projects that will improve its efficiency and reduce your energy burden.



Comparison of Average Annual Costs for a Vermont Home

Category	Percentage
Property Tax	47%
Energy Costs	43%
Homeowners Insurance	10%

Average data as of February 2017

Energy Upgrades In Your New Home

The first few years of living in your home are a great time to invest in energy efficiency upgrades. Visit www.efficiencyvermont.com and you will find:

- Listings for trusted contractors and retailers
- Rebates on the purchase of efficient equipment such as appliances, heat pumps, smart thermostats, water heating systems, and more
- Rebates on air sealing and insulation projects
- DIY videos and how-to resources
- Low-interest financing options

Other Resources

Vermont Gas Systems • 802-863-4511 | www.vermontgas.com
 Burlington Electric Department • 802-865-7342 | www.burlingtonelectric.com
 Vermont's Weatherization Program • www.dct.vermont.gov/oeo/weatherization
 Renewable Energy Resource Center • <http://www.nerc-vt.org/>

Why weatherize?

Comprehensive air sealing and insulation projects not only save money but have benefits like eliminating drafts and reducing allergens like mold—making your home more affordable, healthy, and comfortable.



Be More Comfortable
Making your home energy-efficient will transform the way you feel inside your home and you'll find yourself doing less to keep your home cozy and warm.



Save Money on Energy Bills
On average, homeowners reduce their energy bills by up to 20%, which can equate to hundreds of dollars each year.



A Healthier You
Airborne particles cause poor air quality which can aggravate asthma, allergies, and other health problems. Controlling air leakage and updating ventilation improves the quality of the air your family breathes.



To get started, call Efficiency Vermont at 888-921-5990 or visit www.efficiencyvermont.com today.



Vermont Green Home Alliance (VGHA)

The Vermont Green Home Alliance (VGHA) is an informal alliance of collaborating trade organizations and businesses that operates on a consensus basis. Its mission is the transformation of the real estate market so that buyers and sellers can identify and accurately value energy efficiency and renewable energy benefits.

The VGHA started in 2008, to coordinate efforts of Vermont energy efficiency and construction concerns to reduce confusion in the new home market about Vermont's energy code, Efficiency Vermont certifications, and competing green building certification program providers. In 2010, the VGHA expanded its outreach to include real estate professionals through their associations.

The VGHA has and continues to:

1. educate its participants about available documents, certifications, ratings, scores, and profiles available in Vermont;
2. disclose inventories of high-performance homes, both new and existing;
3. conduct extensive educational work ranging from day-long green real estate symposiums to 2 and 4-hour continuing education credits for Realtors®, supported appraiser education in collaboration with the local Appraisal Institute chapter, and collaborated on education with lenders and lending institutions;
4. help our statewide multiple listing service (MLS) develop Real Estate Standards Organization (RESO) approved 3rd party verified green fields;
5. work to complete the Appraisal Institute's Residential Green and Energy Efficient Addendum²⁰ for buyers (and sellers) of high-performance homes and promote its use early in the mortgage application process;

²⁰ <https://www.appraisalinstitute.org/assets/1/7/ResidentialGreenandEnergyEfficientAddendum.pdf>

6. worked with all parties on the HELIX database to enable more expeditious and accurate energy information sharing through the MLS; and
7. worked with sellers and loan applicants on best practice for lender engagement utilizing templates developed by the Appraisal Institute and the Building Codes Assistance Project on a document titled *Appraised Value and Energy Efficiency: Getting It Right*.²¹

Montpelier Energy Disclosure Ordinance

Montpelier, Vermont has set a goal of becoming a net zero energy city by 2050. However, more than half of the 4,000 residential housing units in Montpelier were built before 1940. In order to help residents better understand the energy performance of their homes, encourage home energy upgrades, provide a level of consumer protection, and gather energy data on the housing stock, the City modified its charter and developed an ordinance that requires home sellers to disclose an energy label and the annual total energy cost when the home is listed for sale.

At the same time, real estate professionals and other stakeholders expressed concerns about potential closing delays, inspection costs and the accuracy of a tool like DOE's Home Energy Score or an automated energy model. Those stakeholders also wanted to take into consideration past utility bills. To address these concerns Montpelier is considering use of NEEP's Energy Estimator platform as the basis for their ordinance. The Montpelier City Council is planning to vote on the Montpelier Home Energy Information Ordinance in 2021

Labeling Impacts

Regional, National and International Energy Labeling Impact Studies

The Rocky Mountain Institute (RMI) has been supporting building energy labeling policy development with U.S. cities. As part of that work, they compiled and summarized the key impacts from home energy labeling and disclosure initiatives from around the world. Their summary, including links to the full studies and updates from some more recent studies, is summarized below. These studies show impacts in terms of sales price premium, time on the market, energy retrofit uptake rates and other benefits.

Green Certified and Efficient homes may sell at a 3-6% premium:

- A meta-analysis of 17 studies showed that green-certified homes sold at a price premium of 4.3%, controlling for factors such as size, neighborhood, and amenities.
- A Freddie Mac study in 2019 found that on average, rated homes are sold for 2.7% more than unrated homes, and among rated homes, those with better ratings sold for 3% to 5% more than lesser-rated homes.
- An assessment from the University of Texas showed that in San Antonio, TX, homes listed as green in local MLS databases sold for a 5.9% premium.
- EU countries have required energy labels since 2002: Energy Performance Certificates (EPCs) have been shown to increase the value of labeled homes, from an average of 3.7% percent in the Netherlands to 5.9% in Portugal.
- An assessment of home sales in California from 2007-2012 found a 5% premium for green-labeled single-family homes.

Energy-transparent and green-certified homes may sell faster:

²¹ https://www.appraisalinstitute.org/assets/1/29/AI-BCAP_Flyer.pdf

- In a study of Chicago’s utility cost disclosure ordinance, homes that reported energy usage sold on average 20 days faster than homes that did not.
- Third-party green certified homes in Portland, OR sold 18 days faster.
- New construction homes with green certifications in Atlanta, GA sold 31 days faster.

Home energy audits and labels may drive significantly higher retrofit rates:

[For reference, the business-as-usual average energy retrofit rate in buildings is estimated to be only 1.0% per year, well below its economically- and technically-viable potential.]

- The Energy Conservation and Audit Disclosure ordinance in Austin, TX, which mandates home energy audits (no score/rating or label) at time of sale, resulted in a 12% retrofit rate in its first year of implementation. Two 2019 studies found that the Austin policy increases price capitalization of energy efficiency and encourages energy-saving residential investments.
- In the years following home energy labeling (EPC) requirements, EU countries have achieved retrofit rates that range from 17% (Portugal, United Kingdom) to 22% (Netherlands), with 37% (France) at the high-end.

Energy information in listings may increase traffic to energy efficient homes:

- An American Council for an Energy Efficient Economy (ACEEE) study from August 2020 shows that efficiency information can influence both simulated home purchase decision-making and willingness to pay for efficiency.

Mortgage delinquency rates may be lower for energy efficient homes:

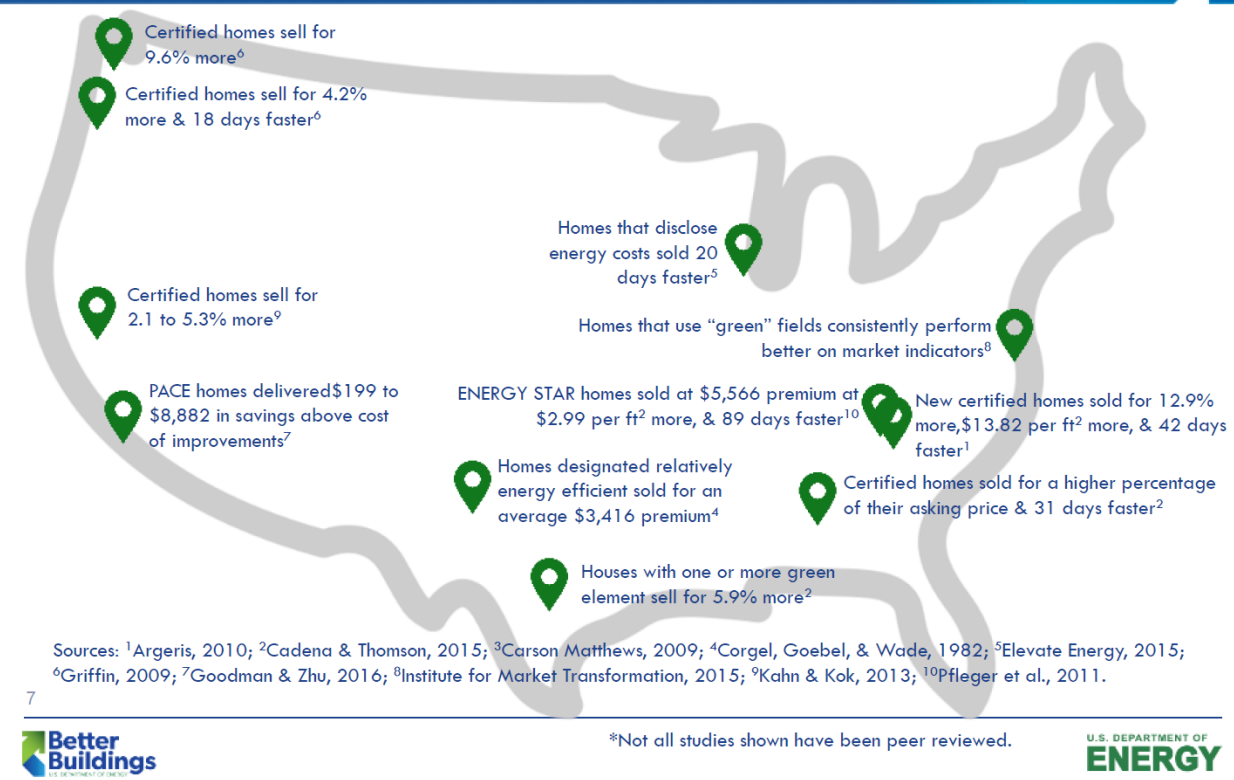
- According to a 2019 Freddie Mac study, homeowners with higher debt-to-income (DTI) ratios—45 percent and above—who have energy-rated homes kept up with monthly mortgage payments better than owners of unrated homes. The 60-day delinquency rate on conventional mortgages was about 2 percent lower for those with energy efficiency-rated homes than those with unrated homes.

Other potential benefits:

- A DOE study finds that Energy burdens, the percentage of income spent on energy bills, can be three times higher for low-income households; home energy labels bring to light the necessary information to help low-income families identify, compare, and mitigate these burdens.
- In a National Association of Realtors (NAR) 2019 survey, 69% of brokers said that energy efficiency promotion in listings is valuable, 59% said consumers are interested in sustainability, and yet 62% are uncomfortable or unsure answering clients’ questions about home performance.

The U.S. Department of Energy has also summarized energy labeling and disclosure impacts based on studies in the following map. Note that these studies were conducted between 1982-2015 and therefore may have occurred during very different market conditions, which may have impacted the results.

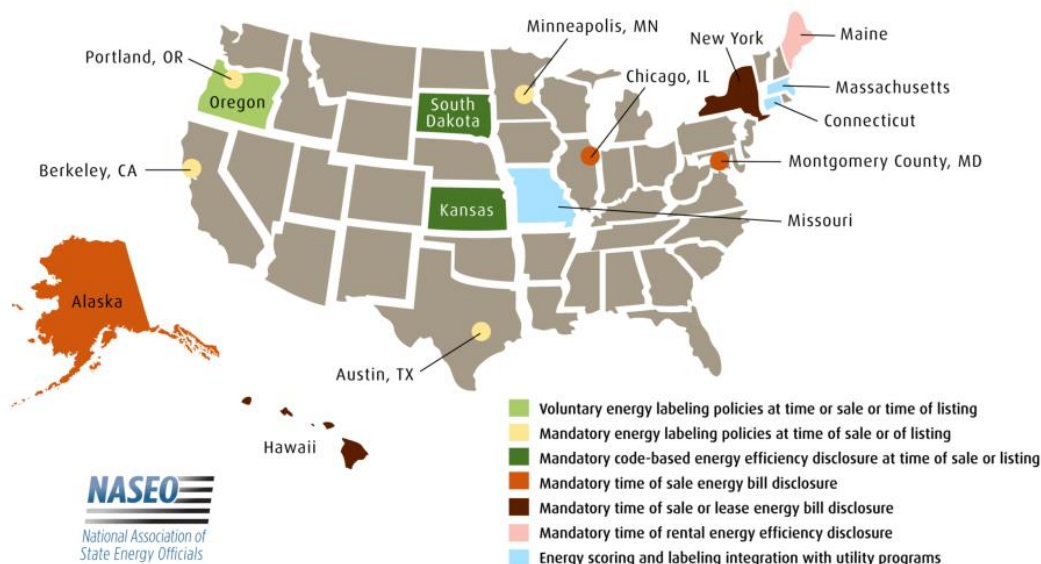
Studies Nationwide Show Energy Efficient Homes Sell for More, Faster



Efforts to make energy labeling widely available and visible have been shown through some of the studies cited above to positively increase consumer awareness and investments in energy improvements. Ways to increase this awareness can include approaches such as policies to encourage energy labeling disclosure and systems to present home energy labels. Vermont currently lists all net metered solar systems on the Energy Action Network Community Energy Dashboard (<https://www.vtenergydashboard.org/>). Such a visual presentation of Vermont Home Energy Profiles and other certifications in a Geographic Information System (GIS) map could help home buyers and renters better understand the energy performance of a home they are looking at purchasing or renting. With promotion, consumers could be made aware of such a resource and be encouraged to view it when house shopping. The HELIX database that holds all the Vermont Home Energy Profiles and other certification data could be the source of a statewide GIS map of home energy information. With appropriate funding, EEU could develop and support such a map and promote it to consumers.

States and cities across the U.S. are implementing voluntary and mandatory policies and programs to make energy performance visible through energy labeling initiatives. The National Association of State Energy Officials (NASEO) has compiled a map of U.S. policies, included below.

Residential Energy Disclosure Policies in States and Cities



Actual and Potential Impacts in Vermont

As discussed earlier, Vermont has some experience with building energy labeling, especially in the new construction market. Vermont has seen the positive impacts of the Home Energy Rating System (HERS) for new construction in the 30 years it has been operating in Vermont. Builders commonly note the HERS score as part of advertising and in the MLS system, Energy Efficiency Utility programs offer HERS ratings to builders, and Vermont's Residential Building Energy Standards (RBES) energy code has recognized code compliance through HERS ratings for decades.

As evidence of the potential impact of labeling in the new construction market, appraiser Amy McClellan provided a case study to support her findings in the Vermont market:

In an analysis completed in 2018 for an upper-end high performance house with sales found in the market of typical stick built new construction and high performance new construction, it was clear from market data that the high performance house sold 20% to 45% higher than houses built to code. Some of the difference in sales price is likely attributable to interior finishes. However, it is clear that a portion of the increase in sales price is due to the cost savings of running the house from the high-performance features. It is apparent that the higher sales price is based on the lower costs of running the house and the higher level of comfort that high performance houses provide.

It is unlikely that the same percentages would be found in houses in the median price range in our market. However, there is market evidence that high performance features, such as solar where the savings can be quantified, that the market will value these savings in energy and will pay more for these features. I have also found limited market data that supports adjustments for the high-performance features on the VERMOD houses, many of which have a HERS rating of 0 to 30. It is clear that the market is willing to pay more for a VERMOD with minimal costs to operate than for a similar house built to code with typical energy costs.

In conclusion market data does support the fact that high performance features that will save the homeowner energy costs will be valued by the market as long as the features cost less than the anticipated savings.²²

Without widespread labeling or other indications of efficiency in the existing homes market, there is less direct evidence of market impact.

On the contrary, the Vermont Association of Realtors® stated that in their conversations with experienced real estate agents concern has been expressed about potential negative impact on property values for poorly performing homes. VAR has also stated that automated evaluation systems are not fair to property owners, many of whom own older properties that will naturally score lower. “We have experience with Auto populated systems like Zillow. They are grossly inaccurate and impossible to change.”

They also point out that, on the other hand, homeowners of highly performing homes should look at reporting as a great marketing opportunity, promoting home energy efficiency as an asset of their home. “The Vermont Association of Realtors® have been providing information on home energy use for many years. If a voluntary measurement system is put into place, we will be able to use it to market the green attributes of high performing homes.”

Realtor Feedback – Vermont Association of Realtors Survey

To better understand the potential impacts of residential building labelling on Vermont’s housing market, the Residential Working Group Impact subcommittee developed a 12 - question survey for industry agents to complete.

The main purpose of the survey was to collect and evaluate the opinions of Vermont’s real estate agents relative to how current buyers and sellers perceive energy and utility costs, and whether those perception positively or negatively impact residential home prices. In general, the survey questions sought to collect opinions regarding:

- How often Real Estate agents provided potential buyers with the required Vermont Energy Pamphlet;
- How useful the Vermont Energy Pamphlet was to buyers and whether they thought the pamphlet encourages buyers to take future steps to save energy;
- How often buyers asked about utility and energy costs;
- How often buyers asked about a home’s energy features (e.g., insulation, windows, heating equipment, air tightness, etc.) of homes they are looking to purchase;
- How useful the existing Seller’s Property Information Report (SPIR) was to buyers and real estate agents, and what could be improved in the form;
- Reaction to a new revised SPIR; and
- Whether a Vermont Home Energy Profile would be a useful tool in helping buyers compare homes along with any recommendations for improvements to the Profile.

Of particular interest was to ascertain whether a new and revised Vermont Home Energy Profile, would help sellers to market their homes and buyers to purchase an energy efficient home.

²² Amy McClellan, MAI, SRA, MBA; milneallen@gmail.com

The Vermont Association of Realtors (“VAR”) declined to distribute this survey to its members. The Association’s Board of Directors informed the Working Group that the VAR forms committee had not considered making any changes to the existing energy disclosure form and SPIR. The Board of Directors felt that the existing process of disclosing energy usage to potential buyers is an effective way to portray energy use.

The Working Group discussed residential building labelling and energy disclosure with other VAR members who believe that the proposed Profile does not reflect real energy cost data and that the data collected on the existing SPIR form does and is therefore preferable.

The SPIR provides a mechanism for a seller to disclose the past years fuel usage to a prospective buyer. As noted above, historic fuel data varies considerably with weather, occupancy, and behavior. In contrast, an asset rating normalizes for these impacts and can provide prospective buyers an estimate of how the home will perform under standard weather and occupancy conditions. Asset based energy estimates are also easier to compare one home to another. The Working Group proposes that the two sets of data (historic fuel records and an asset estimate) should be viewed as complimentary pieces of information.

Working Group members also learned that VAR members are interested in changing the energy disclosure process, and potentially providing the Profile to buyers, provided that such disclosure is voluntary, and that the data reflect actual costs to the greatest extent possible.

Labeling Impact Conclusions

Based on research and discussions, the Residential Working Group concludes building energy disclosure could have the following impacts in Vermont:

- Provide information in support of energy transparency, operating costs and consumer protection for home buyers, owners and renters;
- Provide information and visibility for efficient homes to potentially sell faster and at a price premium;
- Encourage more energy retrofits in existing buildings, which in turn creates more construction jobs and supports economic development;
- Encourage and support energy efficient lending; and
- Provide home energy information and data that could be useful in assessing housing characteristics and retrofit activity.

The Residential Working Group recommends that the following actions are taken to increase the impact of building energy disclosure in Vermont:

- The Legislature, municipalities, energy and housing agencies, and organizations should promote the use of the Vermont Home Energy Profile in real estate transactions in order to encourage investment in home energy efficiency and to drive demand to higher performing homes.
- With appropriate funding, EEU should support municipalities that encourage the disclosure of the Vermont Home Energy Profile in the home buying, selling, and renting process.
- With appropriate funding, EEU should provide and promote a public GIS map display of Vermont labels and certifications.
- With appropriate funding, EEU should support energy labeling in programs and the real estate industry.

- With appropriate funding, EEUs should educate home buyers, sellers, and the housing industry about the benefits of home energy labeling.

Budget Recommendations for Residential Building Energy Labeling Efforts

The Residential Working Group estimates the costs below for a voluntary residential building energy labeling initiative in Vermont. The costs are categorized by annual or one-time required costs (which the working group believes will be necessary for operation of an initiative based on the recommendations in this report) and annual or one-time optional costs (which the working groups believes would be good to have for a successful initiative, but not essential).

Vermont Residential Building Energy Labeling Workgroup Budget Recommendations					
Tasks	Required Costs		Optional Costs		Comments
	Annual	One-time	Annual	One-time	
Label and Tool	\$22,000	\$1,000	\$0	\$0	
HELIX-Clearly Energy Energy Estimator Platform					
HELIX Annual Fee	\$10,000	-	-	-	- HELIX database maintenance and updates, managed by Northeast Energy Efficiency Partnership
Clearly Energy - Energy Estimator	\$7,000	-	-	-	- Clearly Energy's Energy Estimator tool maintenance and updates - Vermont Home Energy Profile design/content maintenance and updates - Based on up to 200 labels/year
Customer Support					
Training and Setup	-	\$1,000	-	-	- Training for customer support staff and set-up
Customer Support	\$5,000	-	-	-	- Cost increasing as the Vermont Home Energy Profile gets more use (assumes voluntary labeling framework) - Support for customers completing the online tool to produce the Vermont Home Energy Profile - Assumed 100 customer or contractor calls at \$50/ea
Scores and Reporting	\$24,060	\$40,000	\$0	\$0	
Administration and Technical Support					
Quarterly advisory board and stakeholder meeting	\$6,000	-	-	-	- Assumes costs for three EEU's and OEO to participate, 3 hrs/meeting, \$125/hr rate
Marketing & Promotion of Labeling Initiative	-	-	-	-	- No budget at this point. All partners may be able to include marketing costs as part of outreach efforts and embedded in other activities.
Overall Administration	\$4,560	-	-	-	- 12% admin fee applied to all program support tasks
Quarterly Reporting					
Software & IT	\$3,500	\$40,000	-	-	- Estimated costs for OEO
Quarterly data review and upload	\$10,000	-	-	-	- Assumes 5 hr/qtr, \$125/hr rate, three EEU's and OEO.
Assessors	\$0	\$1,000	\$11,250	\$17,500	
Assessor Training					
Development of Training protocols	-	\$1,000	-	-	
Training session	-	-	\$5,000	-	- Eight 2-hr training sessions
Assessor Database					
Development and setup	-	-	-	\$7,500	
Hosting and Maintenance	-	-	\$2,500	-	
QA Provider					
Develop QA protocols	-	-	-	\$10,000	
10% QA sample	-	-	\$3,750	-	- Assumes 100 reviews per yr, 30 min each
Other Optional	\$0	\$0	\$0	\$110,000	
Realtor survey conducted by a survey firm independent of VAR to gather the Realtors' perspective	-	-	-	\$30,000	
Evaluation or research into the future impact of Montpelier's Energy Disclosure Ordinance	-	-	-	\$20,000	
Research on sales premiums or time on the market of green certified" homes or homes with solar in the Vermont market	-	-	-	\$20,000	
Analysis of the use of the VAR Sellers Property Information Report from Dot Loop and the impact in the market	-	-	-	\$40,000	
Total Costs	Required		Optional		
	Annual	One-time	Annual	One-time	
	\$46,060	\$42,000	\$11,250	\$127,500	

Commercial and Multiunit Building Energy Labeling

Summary of Recommendations

Below is a summary of the Commercial and Multiunit Building Energy Labeling Working Group (Commercial Working Group) recommendations regarding building energy labeling for Commercial and Multiunit buildings in Vermont. This summary focuses on the items that were required to be addressed by Act 62 and therefore does not include every recommendation or suggestion made in this report.

Voluntary vs. Mandatory Labeling Program

The Commercial Working Group did not reach consensus on the recommendation for a mandatory building energy labeling program for Vermont. Therefore, unless otherwise noted, the recommendations assume a voluntary program. However, for information purposes, this report contains research into mandatory labeling programs in other jurisdictions as well as an examination of the pros and cons of a voluntary vs. a mandatory program.

Energy Label and Benchmarking Tool

The Commercial Working Group concurs with the recommendation of the 2014 Working Group that any Vermont building energy labeling program utilize ENERGY STAR Portfolio Manager (ESPM) as the standard benchmarking tool. The Working Group recommends that Vermont provide a concise, text-based public report via online visual presentment, with a more detailed assessment including graphical representation of building energy usage provided to the building owner utilizing the existing ENERGY STAR Portfolio Manager Statement of Energy Performance Report.

Rating Score and Reporting

The Commercial Working Group recommends that any reported ESPM energy score of 75 or above should be professionally verified regardless of whether the energy labeling program is voluntary or mandatory to help ensure credibility of the building energy data. In addition to Registered Architects and Professional Engineers, the Working Group recommends authorizing AEE Certified Energy Managers (CEM) and Certified Energy Auditors (CEA) to verify ESPM building scores for compliance with any Vermont energy labeling program. The Working Group also recommends that any other credentials approved by the Advisory Committee proposed in the “Statewide Management” section be allowed to professionally verify ESPM scores.

The Working Group recommends that a Vermont Commercial Building Energy Labeling program utilize the Building Energy Analysis Manager (BEAM database), under development using the DOE- SEED Platform, for data storage and management. A statewide program should include developing protocols to provide energy data using automatic data transfer from utility to building owner or directly to ENERGY STAR Portfolio Manager while protecting privacy rights for renters. In addition to the free training and support services offered by ESPM, the Commercial Working Group recommends providing periodic Vermont based trainings on proper data collection and entry methods in ESPM throughout the calendar year to assist those using ESPM.

The Commercial Working Group recommends that benchmarking program administrators contract with a third-party vendor or an existing statewide organization to provide a la carte service options for the Technical Resource Call Center.

Statewide Management

The Commercial Working Group recommends creating an advisory committee to govern the delivery of the Vermont Commercial Building Energy Label and determine the overall roles and requirements for the administration of a voluntary labeling program.

Training and Technical Support

The Working Group recommends that program administrators contract with a third-party vendor or an existing statewide organization to provide a la carte service options for both technical training services and the Technical Resource Call Center.

Public Access to Building Energy Data

The Commercial Working Group recommends adding in the capability to display commercial building energy data on the VT Energy Atlas Energy Site Map to present Vermont Commercial Building Energy Data to the public.

Quality Assurance (QA)

The Commercial Working Group recommends that the same organization or contractor that provides training and technical support services also provide QA services. The QA protocols should set a review goal of 10% of reporting buildings during the initial year of the program and 5% of reporting buildings thereafter.

Scope

Act 62 of 2019 found that to address the issues of increasing greenhouse gas emissions and an old, energy inefficient building stock, the state should “establish a statewide voluntary program for rating and labeling the energy performance of buildings to make energy use and costs visible for buyers, sellers, owners, lenders, appraisers, and real estate professionals.”

In addition to the responsibilities of the Commercial Working Group listed in the Introduction of this report, Act 62 also directs the Commercial and Multiunit Building Energy Labeling Working Group to advise the Commissioner on “each issue listed under ‘unresolved issues’ on page 45 of the [2014 BELWG] report to the General Assembly,” including:

- Budgets for supporting the recommendations of the Working Group
- Schedule for development, field testing and reporting back to the Legislature
- Label design
- Benchmarking and labeling service statewide management, providers, and process
- Technical resource call center
- Quality Assurance (QA) provider
- Data storage
- Public access to labeled building results
- Tenant lease language
- Evaluation

The Commercial Working Group focused on multifamily residential buildings of two or more units and all non-residential buildings. Act 62 defines Multiunit buildings as containing “more than one independent

dwelling unit.” Although many residential energy efficiency programs classify two- and three-unit residential buildings as “single family” the Working Group followed the statutory definition. This may be a moot point in that the commercial building energy labeling program will address only buildings of 10,000 square feet or more and thus is unlikely to include two- or three-unit residential buildings. Regardless, those buildings may be better suited to a residential building energy labeling program


Research into Building Energy Labeling in Other Jurisdictions

To assess the spectrum of programs implemented nationwide, members of the Commercial Working Group spoke with many experts in the field of Commercial Building Energy Labeling. These included representatives of government agencies, benchmarking and transparency policy advocates, Regional Efficiency Organizations (REOs) as well as representatives of cities that have enacted benchmarking and transparency policies and their implementation support contractors.

Many jurisdictions across the country have enacted commercial building energy labeling policies, more commonly known as *commercial benchmarking and transparency* policies. [The Institute for Market Transformation \(IMT\)](#), based in Washington, DC is the primary advocacy group supporting city and state development of commercial building benchmarking and transparency policies. IMT provides many resources for jurisdictions exploring the feasibility of enacting benchmarking and transparency policies through its [buildingrating.org website](#) for cities and governments contemplating commercial building benchmarking and transparency policies, a [map](#) of the US showing the status of these policies across the US, to a draft benchmarking and transparency legislation template.

In addition, the US EPA supports commercial building benchmarking and monitors the status of commercial building benchmarking and transparency policies. It also maintains a [website](#) that allows a visitor to build a report that graphically illustrates the implementation of these policies across the US. Figure 5, below is a screenshot from this website.

Figure 5: US EPA Energy Star benchmarking web page²³



The simple choice for energy efficiency.

ENERGY EFFICIENT
products

ENERGY SAVINGS
at home

ENERGY EFFICIENT
new homes

ENERGY STRATEGIES FOR
buildings & plants

Home » Buildings & Plants » Program administrators » State and local governments » Find benchmarking programs and policies

Buildings & Plants

about us | reference | help desk | portfolio manager login

Owners and managers | Service providers | Program administrators | Tenants | Tools and Resources | Training

Interactive maps for energy benchmarking data, programs, and policies


Toggle between the tabs below to explore interactive maps that present information related to benchmarking in ENERGY STAR® Portfolio Manager. One of the maps allows users to search by zip code for utilities that provide their customers with better access to the data needed to benchmark properties in Portfolio Manager, while the other map shows active programs and policies that leverage Portfolio Manager.


Each map can be hosted on other websites using the embed code located immediately below it.

Find benchmarking programs and policies
Find utilities that provide energy data for benchmarking

Find benchmarking programs and policies

The interactive map below shows a summary of national, state-level, and local efforts that use EPA's ENERGY STAR Portfolio Manager to improve energy efficiency in commercial buildings.




FIND BENCHMARKING PROGRAMS AND POLICIES

Click on a pin or shaded area of the map to see details. Zoom in to view overlapping pins.

- ☒ States with voluntary programs
- ☒ States with benchmarking policies
- ☒ Cities with voluntary programs
- ☒ Cities with benchmarking policies
- ☐ Show only historical policies and programs

CLEAR THE MAP

[View all initiatives in a PDF](#)

KEY

- States with voluntary programs
- States with benchmarking policies
- States with voluntary programs and benchmarking policies
- Cities with voluntary programs
- Cities with benchmarking policies
- Cities with voluntary programs and benchmarking policies

[Host this map](#)

²³ <https://www.energystar.gov/buildings/program-administrators/state-and-local-governments/see-federal-state-and-local-benchmarking-policies>

Voluntary vs. Mandatory Labeling Program

Although Act 62 of 2019 instructs the Working Group to investigate the establishment of “a statewide voluntary program for rating and labeling the energy performance of buildings,” in the interest of giving the legislature a full picture of the program design options, the Commercial Working Group also researched and discussed the merits of a mandatory labeling program. The Working Group defined a mandatory program as one that requires owners of commercial buildings to benchmark their building with ENERGY STAR Portfolio Manager (ESPM) and publicly report the results on a periodic basis. A mandatory program would NOT necessarily require that commercial buildings receive a minimum energy performance score or meet any other performance requirements. Minimum energy performance requirements may be appropriate for mature programs, and many only consider instituting performance requirements only after 5 years or more experience with a building energy disclosure program. On the other hand, a voluntary program would not require commercial building owners to benchmark and report building energy scores, but rather it would provide resources to any commercial building owner to voluntarily benchmark their building(s) with ESPM and publicly report the results.

Currently, there are 16 states with commercial building energy labeling policies. Twelve states have mandatory labeling policies, and four states have only voluntary programs. Four states have a mix of voluntary programs and mandatory policies.²⁴ Seven states with mandatory energy labeling programs require a periodic energy audit, retrocommissioning or other energy improvements for buildings that do not meet minimum performance requirements. Two of those, California and Washington, have minimum performance requirements that cover privately owned commercial buildings.

There are differing opinions within the group on whether a voluntary or mandatory program would be appropriate. A mandatory program could result in increased market-based energy efficiency investments; however, more research needs to be done at the state level to determine the net market effect. A voluntary program would likely result in lower participation, yet it would set up a framework and systems for those that want to benchmark and label their buildings.

Some jurisdictions with mandatory programs have implemented different requirements for different types and sizes of commercial buildings. For example, some jurisdictions exempt residential, industrial, or manufacturing facilities. Virtually all jurisdictions have some minimum size restriction below which compliance is not required. Requirements range from simply requiring buildings to make benchmarking results public to requiring buildings to bring their energy performance up to some minimum performance standard.

A vote of the Working Group on whether to recommend a mandatory program resulted in a split decision: four in favor of a mandatory program, two opposed, and two abstentions. One member advocated for a requirement to benchmark buildings every three years rather than annually to make the program more acceptable.

The Department opposes any mandatory building energy labeling program on a statewide basis as it places an added burden on businesses and residents of multiunit buildings and has additional costs, with unknown benefit and could be perceived by some as intrusive.

²⁴ EPA website: <https://www.energystar.gov/buildings/program-administrators/state-and-local-governments/see-federal-state-and-local-benchmarking-policies> and IMT website: <https://www.buildingrating.org/>

In the interest of full transparency of the deliberations of the Commercial Working Group, below is a summary of the “pros and cons” discussed by the Working Group members in coming to the decision to not recommend a mandatory program. This list reflects a range of opinions from various Working Group members.

In support of a mandatory energy labeling recommendation (pro):

- Transparency – Commercial real estate rental and sales markets work better when all parties are well informed with transparent information.
- Consumer Awareness - Providing complete and consistent energy information to renters and buyers of commercial properties could help better inform purchasing and rental decisions.
- Energy Awareness – Measuring and disclosing energy usage information and estimates of building operating cost allows for better management of energy costs and raises the awareness of energy saving opportunities.
- Increased Participation – Mandatory programs result in much higher levels of participation, although in Vermont, a strong statewide energy efficiency infrastructure may result in higher participation than other jurisdictions under a voluntary program.²⁵
- Encourages Action – There is some evidence that jurisdictions with mandatory energy labeling see an increase in energy efficiency upgrades.

In opposition to a mandatory energy labeling recommendation (con):

- The Legislature Directed the Group to Address a Voluntary Program – The Working Group was asked to address what a voluntary labeling program might look like, not a mandatory approach.
- Lack of an In-State Program Administrator – The state’s Energy Efficiency Utilities have expressed that they do not want to take on the role as the enforcer and administrator of a mandatory program.
- Questionable Impacts – It is unknown whether the impacts reported in other jurisdictions that have mandatory energy labeling will translate to the Vermont market and whether those impacts will justify the costs.
- Misinterpreted Intent of Benchmarking – If mandatory, building owners may view benchmarking as a regulatory burden rather than as an important tool for energy management.
- Cost – There is additional cost to a mandatory labeling program²⁶, due in part to increased participation and additional infrastructure that will need to be supported. Current EEU budgets do not anticipate a voluntary program, let alone the added cost of a mandatory approach.

Label and Benchmarking Tool

The [2014 Report](#) of the previous Commercial Building Energy Labeling Working Group recommended that any building energy labeling program for commercial and multifamily buildings would use ENERGY STAR Portfolio Manager (ESPM) as the benchmarking and energy labeling tool. This Commercial Working Group concurs with that recommendation. ESPM is an operational energy assessment tool which is designed to be used by building owners and property managers with a wide range of knowledge and expertise. ESPM provides the ability to assess building energy performance, water efficiency, and

²⁵ “Voluntary Benchmarking Programs vs. Mandatory Benchmarking Policies: A Comparison” Institute for Market Transformation.

²⁶ See Appendix A: Proposal – Statewide Building Energy Performance Ordinance Support Services

carbon emissions. ESPM uses site-based energy usage intensity (EUI) as its primary metric, as recommended in the 2014 Report to the Vermont Legislature.

ENERGY STAR Portfolio Manager is administered by the EPA. It is free and provides the necessary functions to serve as a reliable tracking and benchmarking tool. Many energy service companies ensure their online tracking tools provide ENERGY STAR Portfolio Manager integration because users have already started using it to gather energy data, to conform with local and state requirements, and National recognition among other reasons.

ESPM calculates an ENERGY STAR score for each building which enables a comparison of a building's energy performance to similar facilities nationwide. A score of 50 represents typical performance, while a score of 75 indicates that your facility performs better than 75 percent of all similar facilities nationwide. An important distinction of the ENERGY STAR 1-100 score is that it is based on *source* energy which accounts for the energy consumed on-site as well as the energy used in generation and transmission.

Label Design and Content

Few commercial building benchmarking and transparency initiatives have developed either virtual or physical labels. New York City and Chicago have developed physical labels and require that they be clearly posted near the building entrance. This approach has its pros and cons.²⁷ Properly designed energy labels can inform building operators, the public, current or prospective renters or purchasers about the energy performance of the building. On the other hand, energy labels can sometimes be confused with other labels, such as restaurant ratings.

The more common method of labeling is the generation of a publicly accessible report via an online presentment. These websites are more commonly used by building owners, prospective renters, energy efficiency programs and advocates, etc. Given this audience, and how they consume and process information, graphics are usually kept to a minimum in favor of clear concise detail, as illustrated in the Benchmarking DC.org and Vermont Energy Atlas graphics found on pages 56 through 58 [Figures 9 through 13]. New York city also provides a publicly available spreadsheet that can be downloaded from the city website.²⁸ The Commercial Working Group recommends that Vermont provide a concise, text-based public report via online visual presentment, with a more detailed assessment provided back to the building owner. (See also "Public Access to Building Energy Data" section, below)

ENERGY STAR Portfolio Manager requires that users set up an account and enter basic building data such as physical location, energy usage, and square footage. After the initial account set-up, which takes approximately one hour, users must input resource consumption data. This includes the resource consumption quantities, costs, and date range. Data entry is manual and is typically determined using utility bills. Some energy utilities have incorporated document data extraction to automate and expedite the utility bill energy data upload process. This may be cost effective for large metropolitan areas across the U.S. but for Vermont applications, the time spent entering data can be significant. Some states have required that distribution utilities automatically upload customer data to ENERGY STAR Portfolio Manager accounts.

²⁷ <https://www.jdsupra.com/legalnews/nyc-now-issuing-energy-efficiency-31413/>

²⁸ https://www1.nyc.gov/html/gbee/html/plan/ll84_scores.shtml

When a user has uploaded enough data to represent 12 months of consumption at a property, they can use the reporting tools to produce a report that can serve as a building energy label. Because this report uses actual utility data it is considered an “operational” label. See the Residential “Asset, Operational and Automated Energy Labels” section on pages 18 and 19 for further description of operational versus asset-based labels.


The list of building attributes provided in the report may contain the following:

1. *Property Name:*
2. *Owner of Record:*
3. *Reported Address:*
4. *Report Status: In or out of Compliance*
5. *Property Type: e.g., Multifamily Housing*
6. *Property Size (ft²):*
7. *ENERGY STAR Score:*
8. *Site Energy Use Intensity (kBtu/ft²):*
9. *Weather Normalized Source EUI (kBtu/ft²):*
10. *Water Use (kgal):*
11. *Total GHG Emissions (Metric Tons CO₂e):*
12. *Total GHG Emissions Intensity (kgCO₂e/ft²):*
13. *Electricity Grid Use (kWh):*
14. *On site Renewable Electricity Use (kWh):*
15. *Natural Gas Use (therms):*
16. *Wood Heating Energy Use (kBtu):*
17. *Chilled Water Energy Use (kBtu):*
18. *Diesel and Fuel Oil Use (kBtu):*
19. *Unique Property ID (see DOE [UBID](#))*

ENERGY STAR Portfolio Manager has the capability to generate several different documents and reports.²⁹ One such document, the Statement of Energy Performance contains most of the information that is relevant for a building performance label. A sample Statement of Energy Performance report document is shown below. The Commercial Working Group recommends utilizing the existing ENERGY STAR Portfolio Manager Statement of Energy Performance Report for purposes of online presentment.

²⁹ <https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager/verify-and-document/sample>

Figure 6: Example of ESPM Statement of Energy Performance



ENERGY STAR® Statement of Energy Performance

77

ENERGY STAR®
Score¹

Sample Property

Primary Property Function: Office
Gross Floor Area (ft²): 50,419
Built: 1951

For Year Ending: July 31, 2014
Date Generated: October 01, 2014

1. The ENERGY STAR score is a 1-100 assessment of a building's energy efficiency as compared with similar buildings nationwide, adjusting for climate and business activity.

Property & Contact Information		
Property Address Sample Property 123 Main St Boston, Massachusetts 02134	Property Owner Property Inc. 123 Early Bird St. Washington, DC 20460 202-999-9876	Primary Contact Jane Doe 123 Early Bird St. Washington, DC 20460 555-123-4567 jane_doe@propertyinc.com
Property ID: 3681885		

Energy Consumption and Energy Use Intensity (EUI)			
Site EUI	Annual Energy by Fuel		National Median Comparison
75.7 kBtu/ft²	Electric - Grid (kBtu)	2,453,824 (64%)	National Median Site EUI (kBtu/ft²)
	Natural Gas (kBtu)	1,273,766 (33%)	National Median Source EUI (kBtu/ft²)
	Propane (kBtu)	91,000 (2%)	% Diff from National Median Source EUI
			-27%
Source EUI			Annual Emissions
181.2 kBtu/ft²			Greenhouse Gas Emissions (Metric Tons CO2e/year)
			311

Signature & Stamp of Verifying Professional

I _____ (Name) verify that the above information is true and correct to the best of my knowledge.

Signature: _____ Date: _____

Licensed Professional

John Smith
 4 Privet Dr
 Arlington, VA 22201
 703-111-1234
 john_smith@energyinspectors.com

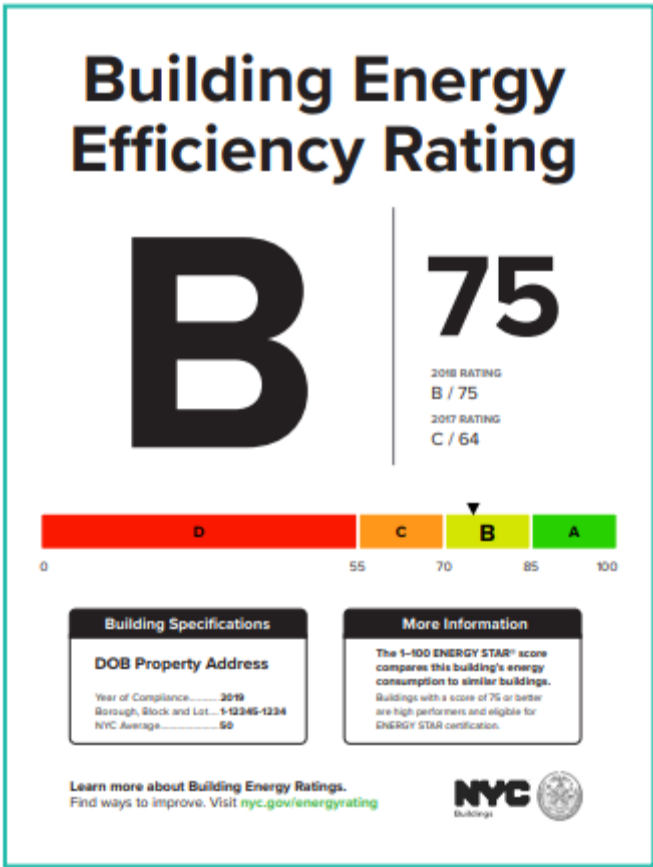
Professional Engineer Stamp
(if applicable)

The Environmental Protection Agency has indicated that customization of their reporting tools may be an option to local governments in the future. The EPA will also be adding data verification fields to Portfolio Manager in early 2021 that could be collected as part of the reporting process.

An alternative would be to develop a specific report format for a Vermont commercial building energy label; however, this would entail additional work and resultant costs. The examples below illustrate what some jurisdictions have developed for their own custom labels.

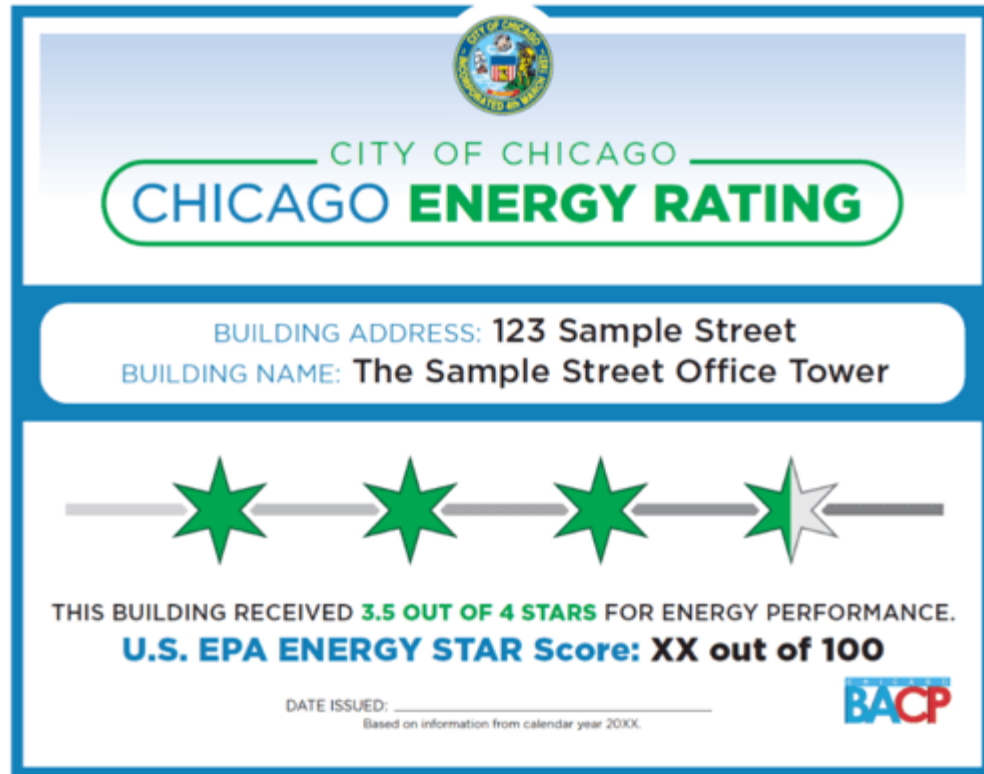
In New York City, the ENERGY STAR Score is converted to a letter grade, similar to school grades to make the relative energy efficiency of the building easier for the public to understand.

Figure 7: New York City Building Energy Label



In the City of Chicago, the ENERGY STAR Score generated from ESPM is converted to a star grade similar to product reviews, to make the relative energy efficiency of the building easier for the public to understand.

Figure 8: City of Chicago Building Energy Label



Rating Score and Reporting

Rating Score

The ESPM energy score signifies the percentile rating of a building relative to similar buildings nationwide. For example, an energy score of 70 for a low-rise office building means that the rated building is more energy efficient (in terms of energy use index, Btu/sq.ft./year) than 70 percent of similar buildings.

Reporting Requirements

To acquire ENERGY STAR® certification a building must achieve an ESPM-generated energy score of 75 or above, verified by a Professional Engineer (PE) or Registered Architect. Although the Commercial Working group does not recommend establishing any minimum performance requirements for commercial buildings, the Working Group does recommend that a Vermont energy labeling program require any reported ESPM energy score of 75 or above be professionally verified regardless of whether the energy labeling program is voluntary or mandatory. The Working Group also recommends that, in addition to PEs and Registered Architects, Certified Energy Managers (CEM), Certified Energy Auditors (CEA) and any other credentials approved by the Advisory Committee (see "Statewide Management") be authorized to verify ESPM building scores of 75 and above under a Vermont energy labeling program. (See "Building Assessor Credentials," below) This would allow for clear and consistent messaging to program participants and would allow Vermont to leverage the established ENERGY STAR marketing and promotional materials.

Data and Records Management

The [Standard Energy Efficiency Data \(SEED\) Platform](#) was developed by the US Department of Energy specifically to manage portfolio scale building performance data from a variety of sources, including ENERGY STAR Portfolio Manager benchmarking data. The SEED Platform can significantly reduce the administrative effort as well as cost compared to developing an entirely new database system to implement building performance reporting and transparency policies and/or programs.

The Northeast Energy Partnership (NEEP), through a U.S. Department of Energy (U.S. DOE) State Energy Program grant, has developed the Home Energy Labeling Information Exchange (HELIX), which serves as a data warehouse for residential energy information. HELIX is built upon the SEED platform and has provided states with a repository for home energy labels, certifications, and solar PV data.

According to NEEP, HELIX will not be made available for use with commercial properties. However, NEEP, along with its partner ClearlyEnergy is currently beginning the development of a next generation platform that will leverage existing DOE SEED platform tools to provide a cost-effective technology solution to help cities and states measure and manage building energy policy goals. The Building Energy Analysis Manager (BEAM) tool will streamline and track compliance with building energy policies, such as building energy benchmarking programs. The BEAM tool will be the commercial counterpart of the residentially focused HELIX database tool and will include enhancements that HELIX does not support.

The BEAM tool is being developed with federal funding in collaboration with a project advisory committee, including representation from Vermont to ensure the tool meets the needs of a broad range of stakeholder needs. BEAM will help the administrators of building energy programs track compliance, manage data, communicate with building owners, and analyze results. BEAM has a flexible structure to accommodate various policy and ordinance program designs: building type, building size, compliance timelines, unit of measure (ENERGY STAR Score, EUI, GHG Emissions, etc.), and more. The objective is to create a comprehensive software solution that can be utilized by a variety of different program designs. The Commercial Working Group recommends adopting the BEAM database tool as the database to store Vermont commercial building energy data.

The VT Energy Atlas currently pulls data from HELIX to populate solar PV installations in the Vermont Energy Site Map. As the BEAM will also be built upon the DOE developed SEED Platform, the VT Energy Atlas will also be able to draw data from this database. The Commercial Working Group recommends that the data for the Vermont Commercial Building Energy Label be populated from the BEAM database.

Administration, Implementation and Overall Entity in Charge

The following are recommendations for the statewide management of benchmarking and labeling services and providers.

Under a voluntary labeling program, the Commercial Working Group recommends that Efficiency Vermont, Vermont Gas, and Burlington Electric Department, as the state's EEU's, collaborate to administer this work if appropriate funding is made available. There are costs associated with implementing a voluntary labeling program that are not directly tied to immediate savings. This will need to be considered when establishing the budget and goals for this program. Participation in the Commercial Working Group throughout 2020 was funded through the EEU Development and Support Service (DSS) budgets. Future DSS budgets do not include administrative costs for a voluntary

commercial building energy labeling program. Therefore, DSS budgets would need to be adjusted to account for the additional administrative scope required. If support of this work leads to the recognition of significant energy savings, it is possible that the EEU's could support such a program in the future through resource acquisition (RA) activities, however RA support would need to be weighed against other energy savings activities.

Advisory Committee. The Commercial Working Group recommends creating an advisory committee to govern the delivery of the Vermont Commercial Building Energy label and determine the overall roles and requirements for the administration of a voluntary labeling program. The advisory committee should include representatives from the following organizations and sectors:

- Department of Public Service
- Energy Efficiency Utilities:
 - Efficiency Vermont
 - Vermont Gas Systems
 - Burlington Electric Department
- Office of Economic Opportunity/Weatherization Assistance Program
- Realtors or the Vermont Association of Realtors
- Commercial building owners or property managers
- Affordable housing advocates and providers
- Other interested stakeholders

This committee should meet regularly to review implementation plans and progress, collect stakeholder input, approve changes, and provide ongoing guidance to the program administrator. As part of its program administrator role, described below, the program administrator will provide regular progress reports and identify issues requiring guidance from the advisory committee. These progress reports could potentially be rolled into existing regulatory processes, which include filing annual plans and quarterly progress reports.

The advisory committee will determine the final roles and responsibilities of the program administrator. At a minimum this role should include the following responsibilities, broken out by either a mandatory or voluntary program, in order to ensure a consistent, statewide approach to energy labeling in Vermont:

Table 1: Responsibilities of the Program Administrator

Task	Voluntary Program	Mandatory Program
Coordination with ESPM customer service	✓	✓
Management of the Building Assessor Training Contract		✓
Management of the HELIX or other Data Aggregator contract	✓	✓
Management of the Labeling program website	✓	✓
Management of the Technical Resource Call Center contract	✓	✓
Management of the QA Provider Contract		✓
Quarterly Advisory Committee Meetings	✓	✓

In a mandatory context another contracted entity with experience operating a mandatory labeling program should assume the administrator role. (See Appendix A for an example of a proposal for third party program management).

Program Implementation Schedule

In Table 2, below, the Commercial Working Group has outlined a program implementation schedule for a voluntary or mandatory program. Although the Working Group is not recommending a mandatory program, that scenario is presented here for informational purposes. The initial phase in either scenario would need to be voluntary to allow building owners and managers to develop benchmarking procedures and program administrators to design and implement reporting, technical support, records management and administrative systems. As shown in Table 2, a voluntary program could be fully functional within two years or less. In the case of a mandatory program, energy labeling would be required for buildings greater than 125,000 square feet in year three. In year four, buildings over 50,000 square feet would begin mandatory reporting and so on down to buildings of 10,000 square feet or greater in year 6. The Commercial Working Group recommends that for buildings less than 10,000 square feet the program would always be voluntary.

The following schedule addresses development, field testing, and reporting back to the Legislature for either a voluntary or mandatory program.

Table 2: Program implementation schedule

Year	Voluntary and Mandatory
0	Pass legislation, sign into law.
1	<ul style="list-style-type: none"> • Outreach to building owners to make them aware of requirements of statute • Administrator of benchmarking initiative begins putting systems in place for the collection and reporting (to public) of benchmarking data, including a confidentiality agreement for public data sharing • Administrator begins collecting existing ESPM data in VT and populating database • Report on administrative plan
2	<ul style="list-style-type: none"> • Building owners begin collecting data and practicing benchmarking and reporting. • Administrator works the bugs out of benchmarking data collection and reporting. • Conduct evaluation and report findings to the Legislature.
Year	Mandatory Only
3	<ul style="list-style-type: none"> • Commercial building owners for properties 125,000 square feet or larger begin mandatory reporting. (approximately 335 buildings) • Conduct evaluation and assessment on whether to move forward with next phase. • Report on findings of the evaluation and recommendations for next phase
4	<ul style="list-style-type: none"> • Commercial building owners for properties 50,000 square feet or larger begin mandatory reporting. Conduct evaluation. (approximately 815 buildings) • Report on findings of the evaluation
5	<ul style="list-style-type: none"> • Commercial building owners for properties 20,000 square feet or larger begin mandatory reporting. (approximately 2,249 buildings) • Conduct evaluation. • Report on findings of the evaluation
6	<ul style="list-style-type: none"> • Commercial building owners for properties 10,000 square feet or larger begin mandatory reporting. (approximately 3,726 buildings) • Conduct evaluation. • Report on findings of the evaluation

Training and Technical Support

Utilizing ESPM as the Benchmarking and Labeling tool comes with additional benefits. ESPM provides free online training materials and webinars for those that wish to utilize the tool. In addition to the free training and support services offered by ESPM, the Commercial Working Group recommends providing periodic Vermont based trainings on proper data collection and entry methods throughout the calendar year to assist those using ESPM. These Vermont-based trainings would involve real time in-person or online workshops and technical assistance to Vermont building owners. They would be tailored to assist building owners and property managers in complying with state or municipal energy labeling standards and requirements. Separate training in the benchmarking of complex buildings could be provided for building owners and professionals on a periodic basis. Training and technical assistance would be provided by the program administrator.

During the voluntary phase - years 1 and 2 of the proposed roll-out - most basic customer technical questions could be handled by ESPM Customer Service at no cost. The Working Group recommends that benchmarking program administrators provide a la carte service options for the Technical Resource Call Center. The group does not recommend that municipalities or the state establish a call center or quality assurance provider from scratch.

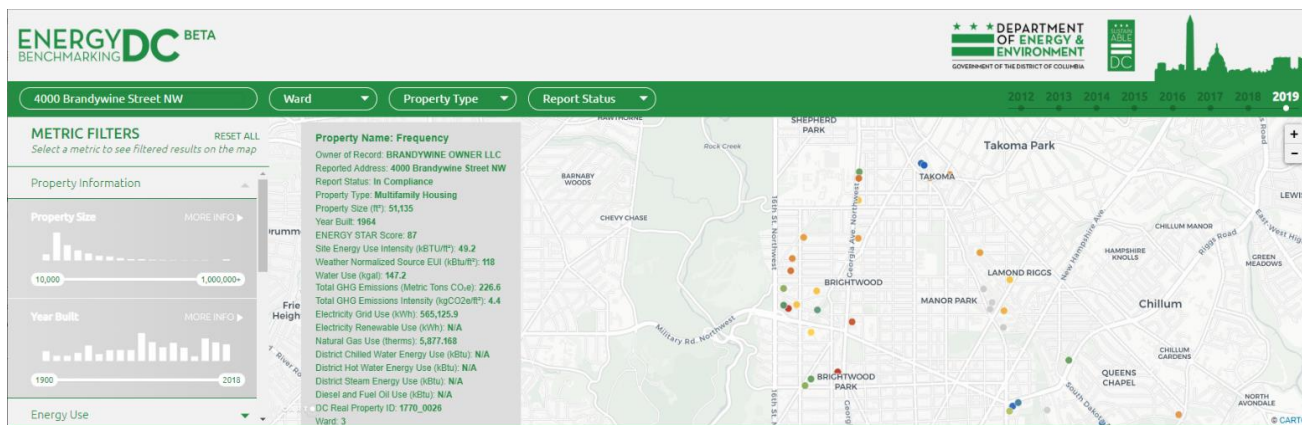
The Technical Resource Call Center would be responsible for fielding questions from building owners, property managers regarding the use of the ESPM tool, including assistance on the proper inputs to use, the generation of energy labels and how to comply with the labeling requirements under the governing rule or ordinance. The call center would augment the existing support functions offered by ESPM customer service, which would be the primary resource for Vermont participants.

Public Access to Building Energy Data

Commercial building benchmarking energy data is typically made available to the public online. It is accomplished through data visualization and can be as rudimentary as an address query that generates a simple report, or as sophisticated as an interactive map of the entire benchmarking and transparency policy jurisdiction that allows the user to drill down to street level address detail to obtain a report for a specific building. The more sophisticated visual presentment websites also allow the side-by-side comparison of the attributes of multiple buildings, allowing prospective renters to shop for spaces with the lowest energy cost of operation, empowering them with information about their potential energy costs for a leased space.

One of the best examples of a well-developed visual presentment is the [Energy Benchmarking DC.org](https://energybenchmarkingdc.org) website as shown below:

Figure 9: Energy Benchmarking DC web page



Vermont is fortunate to already have a sophisticated visual presentment tool in place, the Vermont Energy Atlas [Energy Site Map](#). The capabilities of the Energy Site Map compare very favorably to the best commercial building benchmarking and transparency online visual presentments, such as the Energy Benchmarking DC site shown above. Developed by the [Vermont Energy Action Network](#) (EAN) with grant funding from the US Department of Energy, the Energy Site Map can be used to locate Solar PV, Solar Hot Water, Wind and Hydro installations, and LEED and ENERGY STAR certified buildings, throughout the State. The Energy Site Map currently draws upon the Vermont HELIX Database for some of its data, such as solar PV installation locations and details. The Energy Site Map is currently funded through private philanthropical donations, and plans are in place to further evolve the site with a next-generation version 2.0. The primary improvements planned for the Energy Site Map is the automation of data updates. The Commercial Working Group recommends that the program administrator utilize the Vermont Energy Atlas Energy Site Map to present Vermont Commercial Building Energy Data to the public on a voluntary basis.

The four screenshots below illustrate the capabilities of the Vermont Energy Atlas Energy Site Map, and the ease of getting to a detailed report with just four clicks of a mouse.

Figure 10: Energy Site Map Landing Page

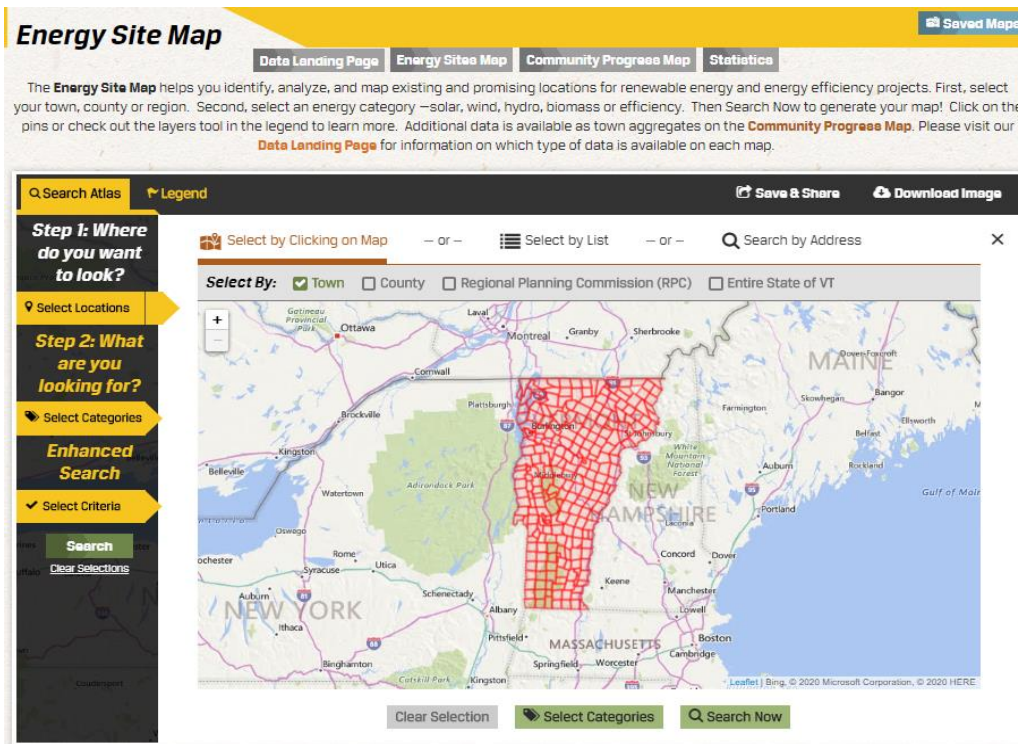


Figure 11: Energy Site Map Category Selection Page

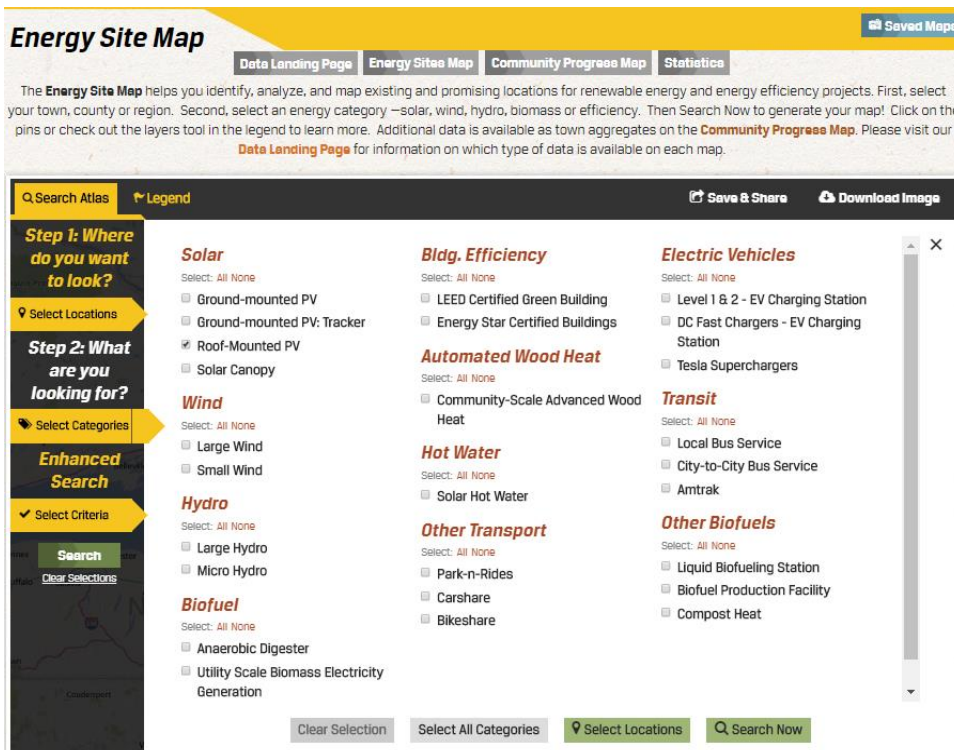


Figure 12: Energy Site Map High Level Summary of Category Page

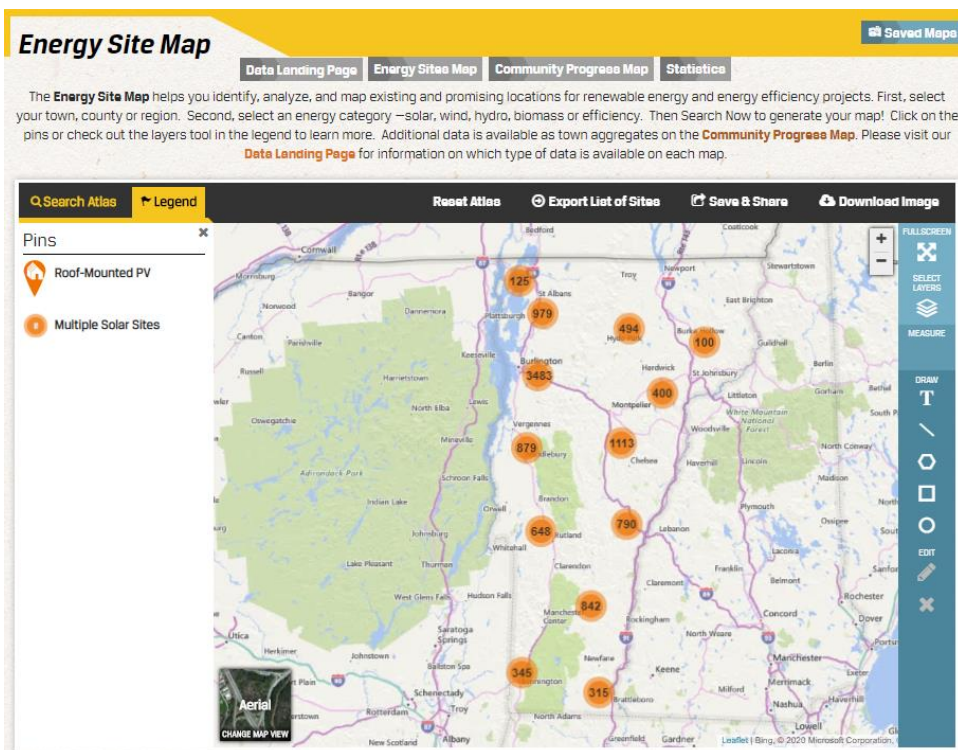
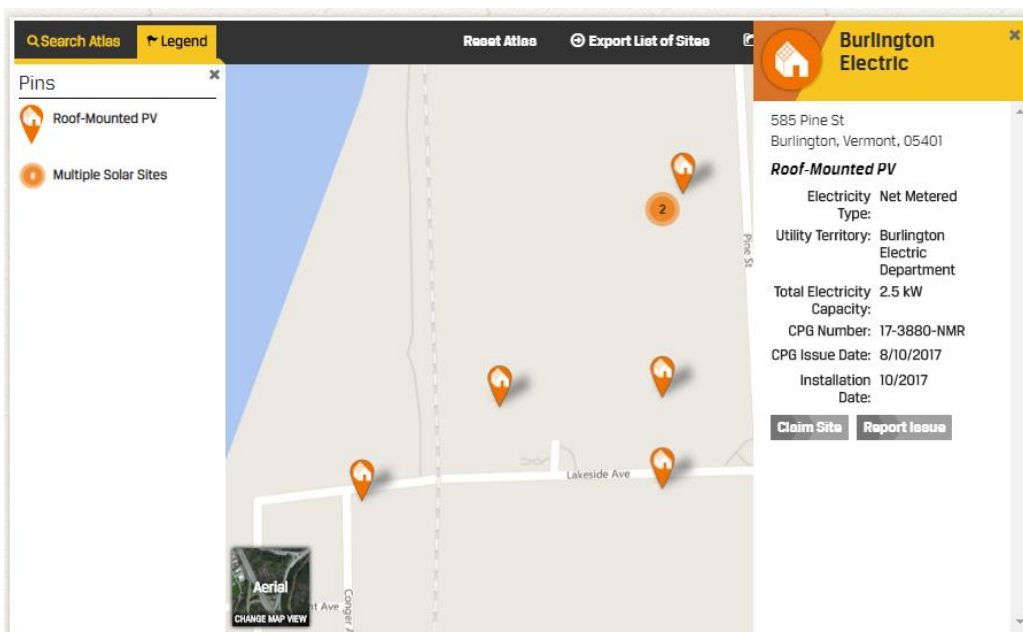


Figure 13: Energy Site Map Site Specific Location and Detailed Report Page



Appropriateness and Viability of Publicly Disclosing Benchmarking Results

30 V.S.A. 62, § 63. MULTIUNIT BUILDINGS; ACCESS TO AGGREGATED DATA requires that distribution utilities and energy efficiency utilities shall provide multi-unit building owners with aggregated monthly energy usage data for buildings with four or more units, with the building unit renters having the ability to opt out of providing the data. Provisions such as this are common to most commercial building benchmarking and transparency policies, with two notable exceptions.

First, the ability of a renter to opt out of providing energy use data to a building owner appears to be unique to Act 62 as compared to other commercial benchmarking and transparency initiatives across the country. Some have included specific language in their commercial benchmarking and transparency ordinances that require building unit renters to provide energy use data to building owners. Additionally, some commercial building benchmarking and transparency policies provide variances for certain specific building types, such as:

- Government owned buildings
- Buildings below a certain size
- Buildings types that do not model well in ENERGY STAR Portfolio Manager, or that cannot receive an ENERGY STAR score.
- Buildings less than 5 years old

Secondly, many commercial building benchmarking and transparency policies do not allow the disclosure of whole building energy data if a single renters energy use is greater than 50% of total building energy consumption. In this case it is thought that aggregation would not be sufficient to mask the energy use of the major consumer of energy in a building.

Given the nationwide advancement of benchmarking and disclosure policies across the nation, with over 30 initiatives in place, the Commercial Working Group believes it is appropriate and viable to publicly disclose aggregated commercial building energy data for multi-unit buildings in Vermont on a voluntary basis. Within the context of protecting privacy rights for building renters and not creating an undue burden on renters and building owners, the Working Group recommends maximizing protocols to provide energy data using automatic data transfer from utility to building owner or to ENERGY STAR Portfolio Manager directly.

Tenant Lease Language

While the development of new, or assessment of existing renter lease language is beyond the expertise of the Commercial Working Group members, existing examples of “Green Lease” language are available. [Green Lease Leaders](#), an advocacy group that promotes green leases to both building owners and renters provides [Green Lease Reference Guides](#) for both parties to a lease. Sample Green Lease language can be as simple as *“Tenant shall be required to submit on a(n) [monthly, quarterly, annual] basis to Landlord energy and water consumption data, including total usage and total charges as they appear on Tenant’s electric, gas, water, and other utility bills, in a format deemed reasonably acceptable by Landlord.”*³⁰ Examples of much more detailed Green Lease language are also readily available.³¹

³⁰ Source: “Making Efficiency Work for You” created by Institute for Market Transformation and Council of Smaller Enterprises

³¹ Institute for Market Transformation Green Lease Library (<http://www.greenleaselibrary.com/>)

Building Assessors

As noted above, the Commercial Working Group has recommended that a Vermont benchmarking program utilize ENERGY STAR Portfolio Manager as the Commercial Building Energy Labeling tool. This tool does not require any specific credentials, endorsements, or licensure for use in benchmarking individual buildings or portfolios. Given that, the need for credentialed building assessors in a voluntary building energy labeling program is minimal.

Building Assessor Credentials

Any building owner, property manager or other professional can input building attributes and energy data into the ESPM benchmarking tool to generate an energy score. However, to obtain an ENERGY STAR® certification for a particular building, a Professional Engineer (PE) or Registered Architect must verify an energy score of 75 or greater. PEs or Registered Architects who wish to be eligible to certify ESPM Energy Scores must also:

- Have a working knowledge of building systems, ASHRAE Standard 55 and 62.1, and the *IESNA Lighting Handbook*; and
- Understand the jurisdiction's engineering and architectural licensure laws, professional ethics requirements, and regulations.

The Commercial Working Group investigated the credentials of energy assessors for energy labeling programs in other jurisdictions. According to the Institute for Market Transformation (IMT), there are three local governments that require credentials for verifying benchmarking reports: Montgomery County, MD; Chicago, IL; and Orlando, FL. Chicago's program requires the building owner to "ensure that reported benchmarking information ...is verified by a professional engineer, architect, or holder of a City-recognized training credential." In Montgomery County, benchmarking data must be verified by a recognized data verifier, defined as a Professional Engineer, Registered Architect, or another trained individual whose professional license or building energy training program credential is recognized by the Director of the benchmarking program. Orlando, benchmarking must be conducted by a qualified benchmarker defined as an individual or entity that possesses a benchmarking certification or other credential approved by the Director of Sustainability. Qualified Benchmarkers include Registered Architects (RAs), Professional Engineers licensed in the State of Florida, Certified Energy Managers (CEM), Certified Facilities Managers (CFMs), Building Energy Audits Professionals (BEAPs), Individuals with a Certificate of Proficiency of Benchmarking (CPB), Real Property Administrators (RPAs), Facilities Management Administrators (FMAs), System Maintenance Administrators (SMAs), System Maintenance Technicians (SMTs), High Performance Managers (HPMs), Certified Healthcare Facility Managers (CHFMs), Certified Plant Maintenance Managers (CPMMs), or designated staff with at least three years of professional experience performing benchmarking and energy audits on similar types of buildings, or additional credentials approved by the Director of Sustainability.

Regardless of what standard is adopted, Vermont may wish to allow other professionals beyond a PE or Registered Architect to certify the building scores generated by ESPM for purposes of compliance with any Vermont standard. In addition to Registered Architects and PEs, the Working Group recommends authorizing Association of Energy Engineers (AEE) Certified Energy Managers (CEM) and Certified Energy Auditors (CEA) to verify ESPM building scores for compliance with any Vermont energy labeling program. The Working Group also recommends that any other credentials approved by the Advisory Committee (see "Statewide Management") be allowed to professionally verify ESPM scores.

Licensure and Bonding Requirements

Licensure and bonding mechanisms are in place for both P.E.s and Architects, and The Association of Energy Engineers (AEE) has a rigorous certification process for CEM and CEA designations, so no additional endorsements or credentials are recommended for any of these professionals. If any Vermont jurisdiction implements a mandatory building energy labeling program, the program administrator may wish to institute a registry of professionals that are authorized to certify ESPM energy scores as well as periodic review of credentials.

Quality Assurance

Any successful energy labeling program, especially a mandatory one, will require consistent Quality Assurance (QA) to gage the level and accuracy of compliance, identify systematic or operational issues, and provide recommendations on improving or streamlining program delivery. The Commercial Working Group recommends that the same organization or contractor that provides training and technical support services also provide QA services. The Working Group recommends that the QA protocols set a minimum review goal of 10% of reporting buildings during the initial year of the program. Thereafter, the Working Group recommends QA of 5% of reporting buildings. According to the inventory of commercial buildings in Vermont and assuming the phased roll out proposed above *with full participation*, this recommendation would result in the review of approximately 35 buildings in year 3, 60 buildings in year 4, 170 buildings in year 5, and about 350 buildings in year 6. Since a voluntary program would achieve much less than full participation, the budget below assumes an annual QA of about 75 buildings annually after year 3. A mandatory program would require annual QA of about 150 buildings per year after year 3.

Evaluation

The scope of the evaluation of the benchmarking program will be determined by its voluntary or mandatory status. Evaluation criteria could include:

Table 3: Building Energy Labeling Evaluation Criteria

Evaluation Criteria
Number of buildings that successfully benchmark and disclose energy use
Efficiency upgrades and associated acquisition costs resulting directly from benchmarking.
Increase participation in energy efficiency utility programs
Verification of ESPM scores for a random sample of buildings
Occupancy rate increases from higher efficiency buildings
Time of sale or listing impacts of real estate sales
Consumer awareness of benchmarking disclosure
Building owner success and level of support required for benchmarking
Effectiveness of program administration

*Additional evaluation for a mandatory program would include assessing level of compliance.

Impacts on the Vermont Housing and Real Estate industry in Vermont

There are currently only three states that passed mandatory benchmarking and transparency policies for private commercial buildings: California, Washington, and New Jersey. New Jersey has not yet enacted

their policy. In all states, there is a minimum square footage threshold below which the benchmarking programs do not apply. As of January 2019, 27 cities have established benchmarking policies.³² The following summarizes key findings from the literature on the impacts of benchmarking policies. While these findings provide some insights into the effectiveness of commercial building benchmarking, more research needs to be done to make stronger associations between labeling laws and market impacts.

- **It is difficult to attribute higher building performance with benchmarking policies alone.** Benchmarking policies often exist alongside a series of other programs or initiatives such as energy codes and energy efficiency incentives, which are designed to increase energy efficiency of commercial buildings. Therefore, most jurisdictions with benchmarking policies are careful not to attribute energy efficiency improvements in commercial buildings on benchmarking alone.³³ At least one academic study, however, found that benchmarking policies in the early adopter cities of New York, San Francisco, and Seattle led to an average of three percent reduction in quarterly utility bills.³⁴
- **Buildings with an ENERGY STAR score may continue to increase performance.** The EPA reviewed the performance of 35,000 buildings with complete energy data in ESPM from 2008 to 2011. The average annual savings from this sample was 2.4%, with an increase of 7% over the three-year period. The study did not indicate which buildings in the study were required to benchmark their energy use by their local jurisdiction.
- **ENERGY STAR Certified buildings may have higher occupancy rates and rents.** Several studies found that Energy Star Certified buildings have higher occupancy rates and rents.³⁵

³² “Benchmarking and Transparency: Resources for State and Local Leaders,” Better Buildings, US DOE.

https://www.energy.gov/sites/prod/files/2019/02/f59/Benchmarking_Transparency_Resource_PDF_Final_2.14.pdf

³³ [Impact Assessment: A Guide for city Governments to Estimate the Savings from Energy Benchmarking and Energy Efficiency Programs](#), IMT.

³⁴ “Does Information Provision Shrink the Energy Efficiency Gap: A Cross-City Comparison of Commercial Building Benchmarking and Disclosure Laws” April, 2015. Resources for the Future.

<https://media.rff.org/archive/files/sharepoint/WorkImages/Download/RFF-DP-15-12.pdf>

³⁵ “The Benefits of Benchmarking Building Performance,” Institute for Market Transformation, December 2015.

https://www.imt.org/wp-content/uploads/2018/02/PCC_Benefits_of_Benchmarking.pdf

Overall Budget

Table 4, below, summarizes the estimated start-up and ongoing annual costs of a voluntary building energy labeling program for Vermont. See Appendix D, page 75 for an example of the budget for a mandatory statewide program.³⁶

Table 4: Estimated budget for recommended voluntary Building Energy Labeling Program

Task	Estimated Startup Cost - Voluntary Program	Estimated Annual Cost - Voluntary Program
Vermont Energy Atlas	\$15,000 - \$30,000¹¹	\$10,000
Develop Commercial Building Energy Data Category ³⁷	\$15,000 - \$30,000	N/A
Annual Site Maintenance	N/A	\$10,000
Building Energy Labeling Database	-	\$7,500
Energy Star Portfolio Manager Platform	No cost	No cost
BEAM subscription fee	-	\$7,500
Technical Training and Support	\$14,000	\$31,750
ESPM-Sponsored Benchmarking Training	No cost	No cost
Contracted Benchmarking Training for Building Assessors	\$8,000	\$18,000
Technical Resource Call Center	\$6,000	\$13,750*
Quality Assurance	\$2,500	\$22,500
Quality Assurance - develop QA protocols and criteria	\$2,500	-
Quality Assurance – average 75 buildings annually	-	\$22,500*
Program Administration	-	\$58,200
Coordination of ESPM Customer Service	-	\$4,000
Management of the Building Assessor Training Contract	-	\$4,000
Management of the HELIX Contract	-	\$4,000
Management of Labeling Program Website	-	\$6,000
Management of the Technical Resource Call Center Contract	-	\$4,000
Management of the QA Provider Contract	-	\$4,000
Quarterly Advisory Committee Meetings	-	\$3,200
Quarterly Reports	-	\$8,000
Annual Reports	-	\$6,000
Program Evaluation	-	\$15,000
Total	\$31,500 - \$46,500	\$110,950

* Annual cost for initial years may be lower, due to lower participation.

³⁶ Note: The budget in Appendix D is provided for illustrative purposes only. This budget was included in a proposal that was not competitively bid and may nor may not represent true cost. The full proposal can be viewed here: https://publicservice.vermont.gov/sites/dps/files/documents/Overlay_Consulting_Benchmarking_Support_Proposal.pdf

³⁷ Dependent upon data quality and web development costs. Estimated budget amounts cannot be depended upon without further development and refining.

Appendix A: Pros and Cons of Mandatory Residential Building Energy Labeling

The Residential Building Energy Labeling Working Group is not recommending a statewide mandatory program, but it was agreed that a discussion of the pros and cons of a mandatory requirement would be included in the report, which is provided below.

In support of a mandatory energy labeling recommendation (pro):

- Transparency – Real estate markets work better when all parties are well informed with transparent information, but currently there is inconsistent and incomplete energy information provided at the time of home transactions.
- Consumer Awareness - Providing complete and consistent energy information to buyers and renters will help better inform consumers' purchasing and rental decisions.
- Encourages Action - As multiple studies in the "Impact" section of this report demonstrate, jurisdictions with mandatory energy labeling have seen an increase in energy efficiency upgrades.
- Energy Literacy – Increased exposure to energy information provides a greater opportunity to educate consumers about energy use and savings opportunities.
- Voluntary Programs Are Too Slow to Affect the Climate Crisis – Previous voluntary building energy labeling efforts in Vermont designed to make energy visible in real estate transactions have been much slower making progress than what our climate crisis now requires.

In opposition to a mandatory energy labeling recommendation (con):

- Voluntary Was Our Directive – The Working Group was asked to address what a voluntary labeling program might look like, not a mandatory approach.
- Voluntary was the direction of the group for most of the process – The Working Group agreed early in the process (in the first couple of meetings) to focus on a voluntary approach, which all the consequent work and discussions were focused on. The mandatory recommendation was proposed at the very end of the process at the October meeting, leaving very little time for discussion and full participation by all of the Working Group members.
- Lack of entity to enforce a mandatory program – the state Energy Efficiency Utilities have expressed that they do not want to take on the role as the enforcer and administrator of a mandatory program.
- Market Interference – Mandates interfere with a free market that should be permitted to operate without intrusion.
- Questionable impacts – It is unknown whether the impacts reported in other jurisdictions that have mandatory energy labeling will apply to Vermont and whether those impacts will justify the costs.
- Not as effective as direct investment - Labeling is an indirect way to promote increased energy efficiency and conservation. Opportunities to invest more directly in energy efficiency and conservation exist.
- Cost – There is a cost to supporting a mandatory labeling program and infrastructure that will need to be supported. Current EEU and OEO/WAP budgets do not anticipate a mandatory approach. There is also a concern that costs will eventually be incurred by buyers and/or sellers, which would negatively impact financially vulnerable Vermonters more so than less financially vulnerable Vermonters.

- Additional Burden on Real Estate Agents and sellers – There is already too much burden placed on real estate agents and sellers at the time of sale (e.g., lead paint, well water, smoke alarms), so it would be better to find another opportunity to provide energy information to consumers. Additionally, Real Estate Agents already work hard for their 3% commissions and the time they would need to invest into this initiative would lower their earnings relative to the required effort they put into purchases and sales.
- Tools and systems currently can't handle all property types – such as multi-family with multiple heating units.

Appendix B: New Home Asset Rating


Energy Rated Homes of Vermont was established as an independent non-profit in 1987. It was absorbed later by the Vermont Energy Investment Corporation (VEIC), a non-profit that holds the appointment to deliver energy efficiency services for the State under the name Efficiency Vermont.

HERS scores were optional as part of a few utility demand-side-management, energy efficiency services for residential new construction in the early to mid-1990s. In late 1996 and early 1997, the Home Builders Association of Northern Vermont, the utilities and State regulators developed a “Good – Better – Best” service structure to provide energy efficiency support for residential new construction. “Good” was Vermont’s new energy code (Residential Building Energy Standards (created by Act 20, 1997) that became effective for all Act 250 governed projects starting July 1, 1997 and expanding to include non-Act 250 projects and additions greater than 500 square feet effective July 1, 1998. A HERS score was one of the compliance methods and a score of 82 points or more (or 80 points or more for log homes) was, along with meeting Basic Requirements, sufficient to demonstrate RBES compliance. HERS scores of this era, now called “Classic” HERS, used a scale where 100 points was the best score and 0 points was the worst. As shorthand, a Star Rating system was used with 5 Stars + being the highest range of that system. “Better” and “Best” were residential new construction (RNC) utility efficiency, demand-side management services. “Better” (marketing name: Vermont Advantage Home) paid incentives for a variety of energy efficiency feature installations. The option to acquire a HERS was available at a cost to the RNC service participants for \$250. The initial cost of the HERS was \$350; however, after receiving a HERS score documenting RBES compliance using a HERS Rating and meeting utility program requirements, a \$100 utility rebate was paid. Most Vermont Advantage Home participants opted not to pay for a HERS. The “Best” efficiency certification was named the Vermont Star Home. RNC participants had to pay for the HERS but would receive a full rebate of the \$350 cost of the HERS for successfully completing a home meeting the U.S. EPA’s ENERGY STAR® Home standard.

By mid-April 1997, and the adoption of a nearly statewide residential new construction service, the members of the Joint Utility Working Group (Burlington Electric Department, Central Vermont Public Service, Citizens Utility Corp., Green Mountain Power, Vermont Electric Co-operative, and Vermont Gas Systems) engaged a contractor to deliver uniform RNC services under the name the Vermont Star Homes Program. Under this arrangement, Energy Rated Homes of Vermont performed HERS Ratings primarily for those homes seeking Vermont Star Home certification. By December 31, 1997, 20 HERS had been issued to Vermont Star Homes participants.

Efficiency Vermont, a statewide energy efficiency utility, was established after a successful bid was made by Vermont Energy Investment Corporation (VEIC) and Efficiency Vermont became operational in March of 2000. Nearly all responsibility for demand-side-management was transferred to Efficiency Vermont. Among the first significant changes made to Vermont Star Homes was to eliminate the participant cost of the HERS in the summer of 2002. Without a participant charge for HERS the number of scores issued steadily increased and chronicled Vermont’s improved building performance over time.

In 2006, the HERS score was significantly modified so that lower, not higher, scores signified a less energy use. The old HERS was renamed the “Classic” HERS and the new format was named the “Index Score”. The Index Score now compares the Rated home to itself built to the specifications of the International Energy Conservation Code (IECC). A home built to the minimum IECC specifications (the Reference Home) has a HERS Index of 100 points. The high end of the Index Score is open ended and Index Scores can document zero energy homes with an Index Score of 0 and can document homes that produce more energy than the consume by showing a negative HERS Index Score.



**5 Stars Plus
Verified Condition**

Uniform Energy Rating System									
1 Star	1 Star Plus	2 Stars	2 Stars Plus	3 Stars	3 Stars Plus	4 Stars	4 Stars Plus	5 Stars	5 Stars Plus
500-401	400-301	300-251	250-201	200-151	150-101	100-91	90-86	85-71	70-0

HERS Index: **55**

General Information	
Conditioned Area:	2146 sq. ft.
Conditioned Volume:	15473 cubic ft.
Bedrooms:	3
House Type:	Single-family detached
Foundation:	Unconditioned basement

Mechanical Systems Features	
Heating:	Fuel-fired hydronic distribution, Propane, 92.0 AFUE.
Water Heating:	Integrated, Propane, 0.85 EF, 80.0 Gal.
Duct Leakage to Outside:	NA
Ventilation System:	Exhaust Only: 169 cfm, 54.0 watts.
Programmable Thermostat:	Heating: Yes Cooling: No

Building Shell Features	
Ceiling Flat:	R-37
Vaulted Ceiling:	NA
Above Grade Walls:	R-19
Foundation Walls:	R-10.0
Slab:	None
Exposed Floor:	R-39, R-0
Window Type:	U-0.35, SHGC-0.30
Infiltration:	Rate: Htg: 830 Cfg: 830 CFM50
Method:	Blower door test

Lights and Appliance Features	
Percent Fluorescent Pin-Based:	70.00
Percent Fluorescent CFL:	0.00
Refrigerator (kWh/yr):	460.00
Dishwasher Energy Factor:	0.66
Clothes Dryer Fuel:	Electric
Range/Oven Fuel:	Propane
Ceiling Fan (cfm/Watt):	0.00


The Home Energy Rating Standard Disclosure for this home is available from the rating provider.
REM-Rate® - Residential Energy Analysis and Rating Software v12.5 Vermont
 This information does not constitute any warranty of energy cost or savings.
 © 1985-2008 Architectural Energy Corporation, Boulder, Colorado.

Estimated Annual Energy Cost			
Verified Condition			
Use	MMBtu	Cost	Percent
Heating	71.7	\$2276	67%
Cooling	0	\$0	0%
Hot Water	3.9	\$125	4%
Lights/Appliances	22.6	\$668	20%
Photovoltaics	-0.0	\$-0	-0%
Service Charges		\$119	4%
Total		\$3369	100%

This home meets or exceeds the minimum criteria for all of the following:
 Federal Energy Policy Act, 2005*
 Vermont Energy Star Homes Criteria*
 Vermont Residential Energy Code*

* Compliance with criteria for this program is determined by the rater.

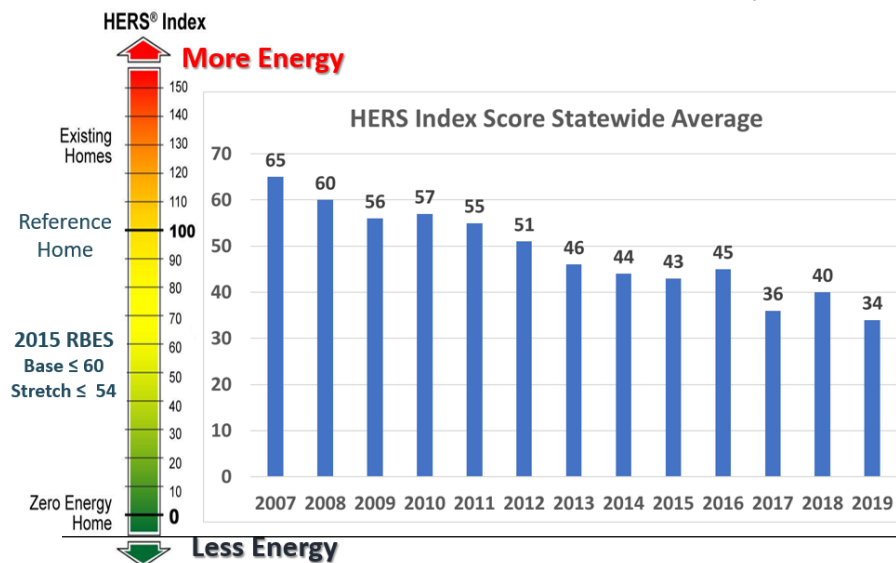
Vermont Energy Investment Corp.
 255 South Champlain St.
 Burlington, VT 05401
 800-639-6069
 Fax 802-658-1643
 www.veic.org



But for all but a brief period where Efficiency Vermont reinstated HERS as an option, HERS Index Scores have been provided to all parties successfully achieving Efficiency Vermont’s RNC service requirements. The option to substitute a higher rebate for forgoing a HERS was removed as Efficiency Vermont recognized the greater value that HERS Index Scores would have when entered into the real estate multiple listing service (MLS) and accessible to Realtors®, appraisers, and lenders.

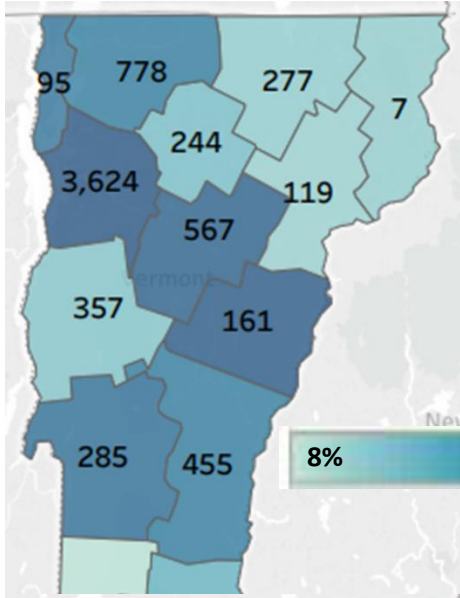
Over the years Efficiency Vermont’s Residential New Construction Service participants have steadily increased the energy efficiency of new Vermont homes. This is illustrated in the Statewide and by county charts below showing the average HERS Index Scores.

Home Energy Rating (HERS) Index Scores for Efficiency Vermont Residential New Construction Participants

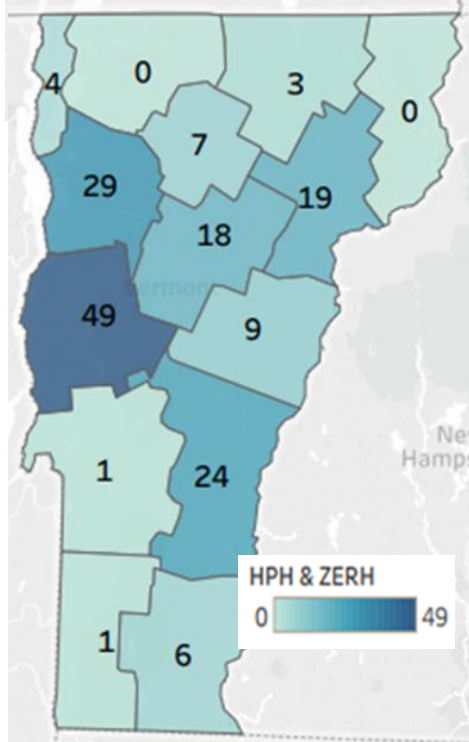


County **2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019**

Addison	67	58	57	55	55	48	51	44	39	28	35	36	34
Bennington	58	66	55	60	57	53	49	50	42	47	41	37	42
Caledonia	57	60	53	54	57	59	63	44	38	39	8	21	28
Chittenden	66	62	61	61	58	54	53	54	51	53	52	50	38
Essex	68	85							59		36		
Franklin	64	63	63	62	59	55	57	54	55	54	54	53	47
Grand Isle	64	63	52	57	46	43	53	48	30	48	48	56	10
Lamoille	65	65	57	60	52	50	28	46	45	47	22	41	38
Orange	64	56	57	59	52	48	37	36	42	32	45	40	27
Orleans	68	62	57	54	55	63	51	50	48	44	23	35	21
Rutland	66	60	55	50	55	53	49	46	46	44	31	42	41
Washington	64	57	55	57	53	51	29	43	45	46	34	39	33
Windham	62	58	60	59	55	55	41	34	43	41	41	42	38
Windsor	58	57	52	55	53	46	35	38	31	40	33	31	22



The map at left shows the market penetration and total number of Efficiency Vermont green certified new homes by county with Home Energy Rating Scores from 2000-September of 2019. In this period Efficiency Vermont certified over 7,000 new homes statewide. The color shows the market share these Efficiency Vermont green certified new homes achieved by county. The number shows the total of Efficiency Vermont green certified new homes (e.g. homes with Home Energy Ratings) by county.

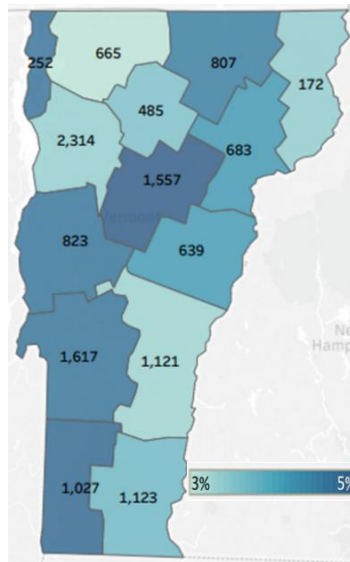


There were 189 Efficiency Vermont Certified High-Performance Homes and U.S. DOE Zero Energy Ready Homes Statewide built from 2013 through February 26, 2020. These are homes with HERS Index Scores of 40 points or less. There have been 19 of these new homes certified between October 1, 2019 and February 26, 2020.

Color and number show the Efficiency Vermont Certified High-Performance Homes and U.S. DOE Zero Energy Ready New Homes by county.

The Residential Energy Services Network has opened its database of Home Energy Rating Index Scores to appraisers in effort to provide data that appraisers can use to find comparable homes as well as utilize the HERS Index Score in monetizing and justifying contributory value of the home's energy savings over the 100 point HERS Reference Home (a home meeting the 2006 International Energy Conservation Code – 2006 IECC).

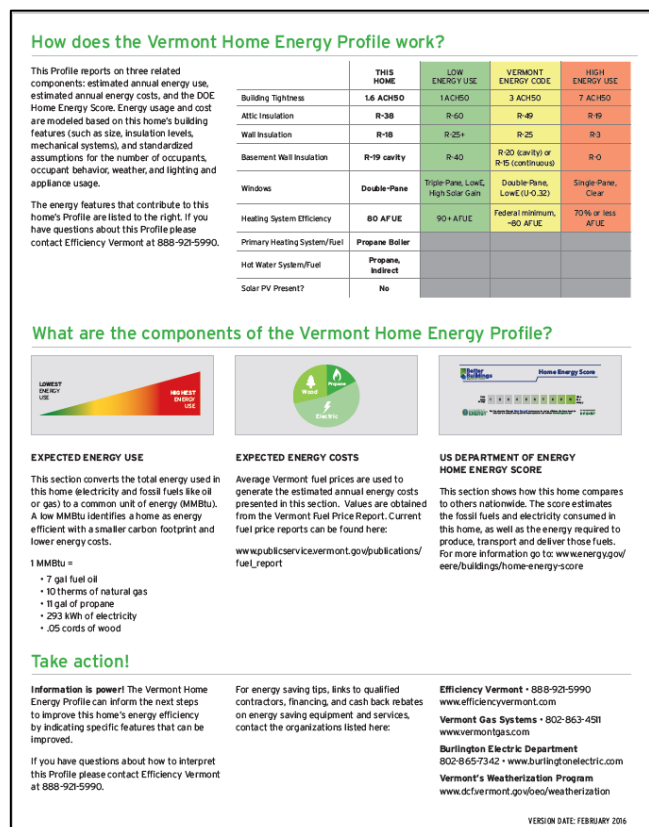
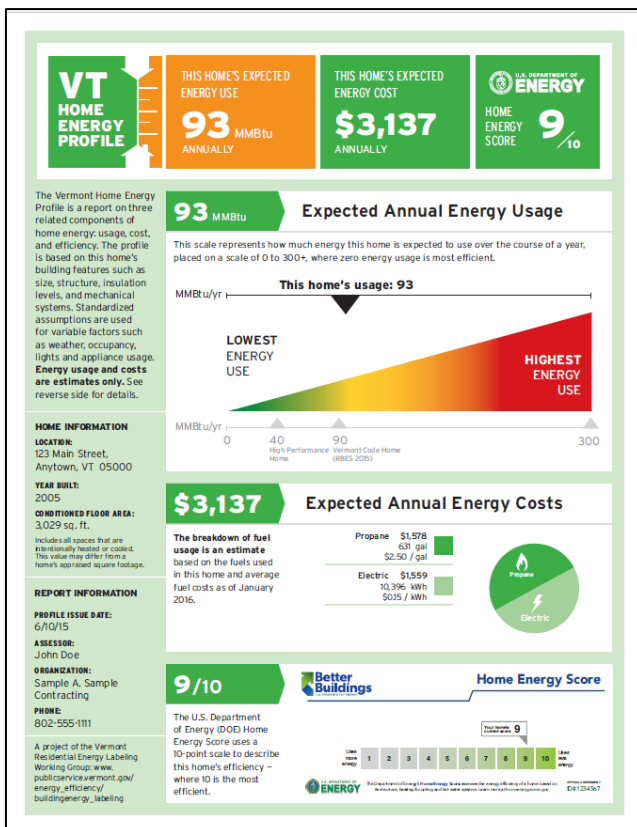
Appendix C: History of Asset Rating for Existing Homes



There are over 13,000 existing homes statewide where significant weatherization work, following modern building science principles, was performed from 2011 through 2018 by Efficiency Vermont, Vermont Gas Systems, and the Vermont Weatherization Assistance Program. In the map at left, the color shows percent of weatherized existing homes and the number shows the total weatherized existing homes by county.

Nearly all these homes lack an energy asset label/rating and have only audit and incentive reports to document their energy efficiency.

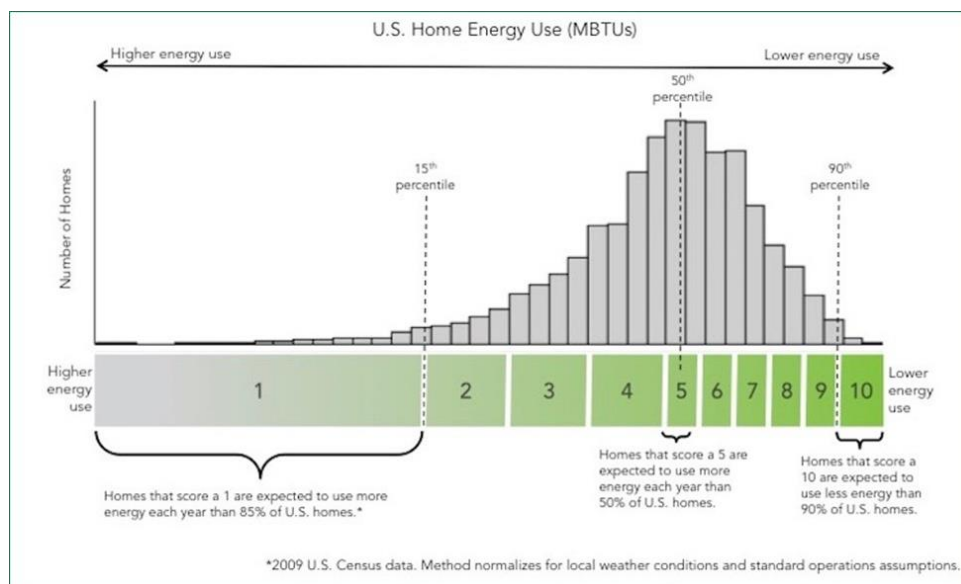
Under legislative and regulatory directives, a group of stakeholders was convened as the Residential Energy Labeling Working Group to consider building energy labels for existing homes. This group reviewed the extensive market outreach conducted and worked to create a proto-type existing home



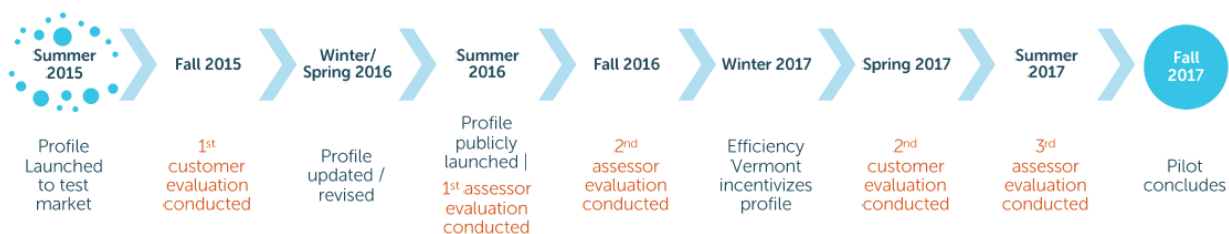
energy asset rating energy label called the Vermont Home Energy Profile – “Profile”. The Profile’s rating

scale (Pilot program version shown below), like the HERS Index used with new construction, had lower ratings associated with less energy use.

The U.S. Department of Energy began promoting their Home Energy Score (HES) around 2011. HES scores use a ten-point scale where 10 is most energy efficient and 1 is least energy efficient, the opposite of the HERS Index Score and the Vermont Home Energy Profile.



A Pilot study was developed and implemented by Efficiency Vermont in collaboration with the U.S. DOE and the Residential Energy Labeling Working Group.



The Pilot goals³⁸ were to:

- complete 200 Profiles/HES,
- test Profile's value in engaging customers,
- test whether an Assessor incentive was needed and what amount would be appropriate to attract Home Performance Contractors, Realtors®, and Home Inspectors as Assessors; and
- evaluate accuracy and practicality of the DOE HES software with Vermont's climate and housing stock

Marketing the Pilot study

- Partner/Assessor promotional materials included:

³⁸ Source: Efficiency Vermont – Vermont Home Energy Profile Pilot: Results & Next Steps

- Sell sheets
- Twitter content
- Front Porch Forum copy
- Newsletter copy
- Dedicated web landing page
- Watts New – Efficiency Vermont residential customer newsletter
- Facebook campaign

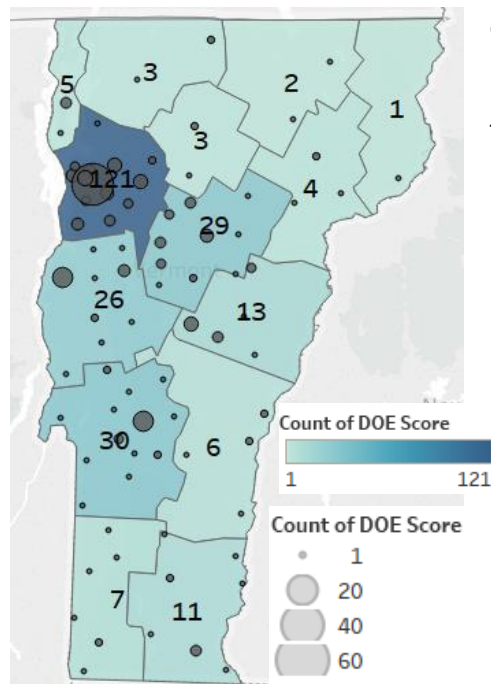
This marketing was supported by Efficiency Vermont staff who handled 344 inquiries regarding the Profile.

Summary of Profile/HES labeling results

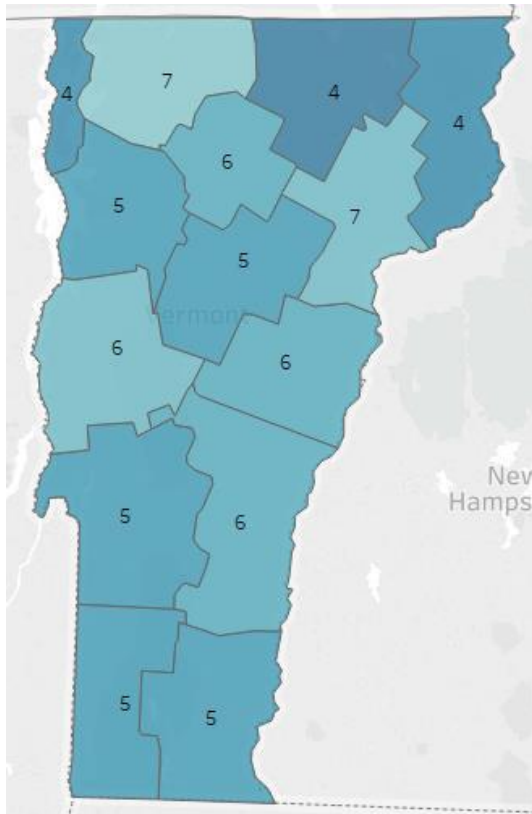
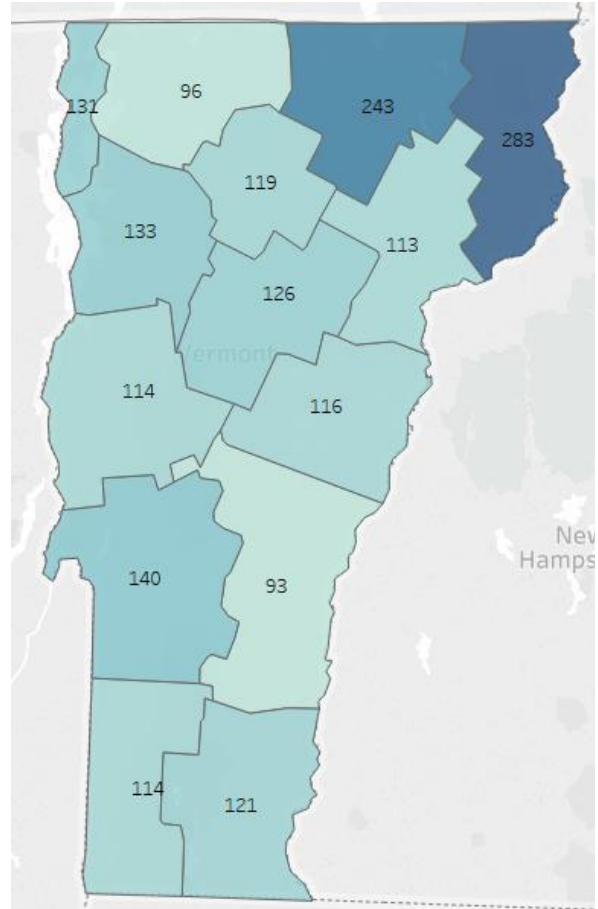
There were 261 Profiles and U.S. DOE HES delivered; 202 Profiles during the period where they were incentivized at \$200 for each initial site visit and \$50 for each final site (post upgrade). There were 18 “Assessors” trained to meet U.S. DOE’s Assessor criteria,

most were Building Performance Institute (BPI) certified home performance contractors, 2 were Efficiency Vermont staff members. There were 12 Quality Assurance visits completed.

The map at left shows the number and location (by county and zip code) of Vermont Home Energy Profiles and U.S. Department of Energy Home Energy Scores.



The map at right shows the average Profile score (by county) for the Vermont Home Energy Profiles issued during the pilot. The average score represents the total energy use (all fuels and electricity) for all energy use estimated in millions of British thermal units (MMBtu). Lower numbers indicate less estimated energy use.



The map at left shows the average U.S. DOE Home Energy Score (by county) for the Home Energy Scores issued during the pilot. The average score represents the total energy use (all fuels and electricity) for all energy use estimated using the HES 1-10 rating. Higher numbers indicate less estimated energy use.

Pilot Study Conclusions summarized:

Ultimately, a decision was reached to cease use of the U.S. DOE's Home Energy Score as:

- assessor training proved to be more than home inspectors and Realtors® were comfortable in performing;
- while the DOE HES software did a good job of estimating energy use, the actual Home Energy Scores often didn't show much change after significant energy efficiency improvements were made; a frustration for owners and home performance contractors and an impediment to stimulating interest*; and
- the DOE HES software had difficulty with wood heat, homes with multiple fuels, and other regionally specific energy efficiency measures and modeling parameters (e.g., cold climate heat pumps, and electrical source energy characteristics, etc.).

*As one assessor said, "When a client is paying a premium for upgrades, they are expecting the tool to show improvement and realistic savings."

Findings and achievements regarding the *Pilot goals* included:

- *complete 200 Profiles/HES*, - exceeded the number planned;
- *test Profile's value in engaging customers* – Yes, there was value, but the main value was in getting an energy expert into the home;
- *test whether an Assessor incentive is sufficient to:*
 - *garner interest from Realtors® and home inspectors in Profiles at time of sale* – Not so far, although the new time-of-sale information should help
 - *garner interest from Home Performance contractors/customers* – Yes, some; and
- *evaluate accuracy and practicality of the DOE HES software with Vermont's climate and housing stock* – found to be reasonably accurate but having many practical challenges.

Appendix D: Mandatory Building Energy Labeling Program - Vendor Proposal

Below is a sample budget for administering a statewide mandatory building energy labeling program. This budget was included in a proposal that was not competitively bid and may nor may not represent the true cost of administering such a program. The full proposal from Overlay Consulting can be found on the Department of Public Service website at the following link:

https://publicservice.vermont.gov/sites/dps/files/documents/Overlay_Consulting_Benchmarking_Support_Proposal.pdf

Annual Budget Summary

Program Year	FEE									Total Budget
	Covered Building List Development & Update	Utility Company Data Upload Coordination	Touchstone Software Configuration & License	Program Design, Material Development, & Updates	Help Center Setup & Admin	Training & Outreach	Scorecard Design & Distribution	Interactive Map	Building Owner Portal (Optional)	
2021	\$23,750	\$14,250	\$67,750	\$46,000	\$0	\$22,000	\$0	\$0	\$0	\$173,750
2022	\$8,500	\$2,000	\$47,000	\$0	\$30,750	\$13,000	\$24,500	\$25,000	\$56,875	\$207,625
2023	\$9,500	\$2,000	\$47,875	\$10,875	\$51,625	\$71,490	\$9,000	\$9,000	\$50,000	\$261,365
2024	\$9,500	\$2,000	\$47,875	\$10,875	\$64,625	\$75,225	\$9,000	\$9,000	\$50,000	\$278,100
2025	\$9,500	\$2,000	\$47,875	\$10,875	\$137,425	\$95,655	\$9,000	\$9,000	\$50,000	\$371,330