

Tompkins Residential Energy Score Program and Implementation Plan

Second Draft

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1. Executive Summary

The Residential Energy Score Project (RESP) team¹, a consortium of five (5) municipalities in Tompkins County, received a grant from New York State Energy Research and Development Authority (NYSERDA) to develop a Home Energy Rating and Disclosure Program. The team is proposing a voluntary, residential energy score program for homes within Tompkins County. This project is aimed at increasing consumer and homeowner awareness and understanding of energy use and energy efficiency in homes. The program is designed to support the region’s energy and greenhouse gas emission reduction goals by increasing energy efficiency in the housing sector of Tompkins County.

As described in this document, homes in Tompkins County will have the option to receive an energy rating that generates a numerical score. The score, and accompanying information, will allow homeowners, homebuyers, realtors, and others to understand the energy use of the structure, and to compare the energy use of homes across the county. While there are many ways to describe the energy efficiency of a house, some descriptions prove more useful than others. An asset rating, a key part of the proposed program, provides one clear metric that removes the influence of occupant behavior, fuel price and weather fluctuations. It’s helpful to think of this as an EnergyGuide Label for a home, similar to

those provided for major appliances. The asset rating provides homebuyers a way to compare the estimated energy use of homes they are considering and the estimated annual cost to run them. This transparency provides homeowners and buyers an opportunity to value energy efficiency in the real estate transaction, motivates homeowners or sellers to improve their score, and allows greater opportunities to highlight investments in energy efficiency at time of sale (Figure 1). Policymakers gain reliable data about status, progress, and target areas for needed assistance and opportunities for reducing emissions in the community.

This document describes a proposed home energy score program for Tompkins County, including recommendations for designing a home energy label, phases for implementation of the program and an evaluation plan for policy optimization going forward.

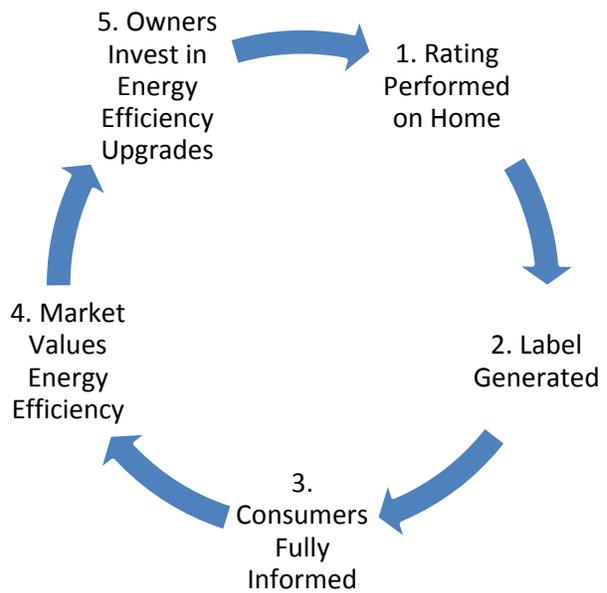


Figure 1: Residential Energy Score Program as a cyclical process

¹ The RESP team consists of representatives from the Towns of Danby, Caroline, Ithaca and Ulysses, and the City of Ithaca, as well as support from the Tompkins County Planning Department and Cornell Cooperative Extension.

The recommendations include:

1. Two nationally recognized, industry backed rating systems should be incorporated to allow for including new and existing homes and multifamily units while still providing the value of one consistent number for comparison across homes. The team has named this one number the *TOMPKINS RESIDENTIAL ENERGY SCORE*. Although “Tompkins” is included in the name, the score and units are applicable anywhere, not limited to Tompkins County.
2. The Score should range from roughly 0-200+ in units of energy use per year in MMBtu’s of site energy.
3. The program should incorporate ratings at any time, but encourage ratings at significant points in the homeownership life cycle. These points include: time of home energy audit, retrofit, or renovation; time of home inspection; time of code inspection; and time of real estate transaction.

Phase 1 involves securing funding for development and implementation to move the program forward. Funding allows Phase 2, securing an implementer to drive the program forward, to take place. The Program Implementer will work with the Project team to complete Phase 3, including program design, marketing, education, and program infrastructure. Rolling out the actual program and allowing participation starts with a pilot (Phase 4) and then moves to a voluntary program accompanied by heavy marketing and education (Phase 5). During the transitions from phase 4 to 5, the Implementer should evaluate progress, data, and public feedback to make appropriate adjustments to the program going forward. Finally, in Phase 6, we suggest evaluating the program and local readiness or need for a home energy scoring mandate or law. Here we present these stages in detail for a comprehensive understanding of the proposed program, implementation, and the ability to manage data and evaluate effectiveness.

A recent white paper by Better Buildings® identified the invisibility of energy efficiency and the lack of a standardized data field to incorporate into the Multiple Listing Service (MLS) as the two top barriers to valuing energy efficiency in residential real estate transactions. (Elizabeth Stuart, November, 2015) The proposed program in this document, with wide-spread adoption, would remove these barriers in Tompkins County.

Other expected outcomes of this project include the following: local job development; reduced greenhouse gas (GHG) emissions; increased comfort and safety for homeowners; durability of the housing stock; partnerships with Realtors and other key industry professionals; and increased energy and economic security.

2. Background

Tompkins County has a goal of an 80% reduction in greenhouse gas emissions from 2008 levels by 2050. Where will these reductions come from? The U.S. Environmental Protection Agency (EPA) estimates that roughly 20% of the energy use and greenhouse gas emissions in the United States come from our homes. According to the March 2016 *Tompkins County Energy Roadmap: Evaluating Our Energy*

Resources, it will be critical to reduce energy demand in order to meet emissions goals. The Roadmap determined that to meet emissions goals by 2050, the community will need to achieve at least a 35% reduction in energy use in existing buildings through retrofits and upgrades. This project is aimed at helping meet the region’s energy and greenhouse gas emission reduction goals by increasing energy efficiency in the housing sector of Tompkins County with a residential energy score PROGRAM.² The practice of providing a metric to represent the relative energy efficiency or energy use of a home is often referred to as home energy scoring, or labeling.

This project is in line with other efforts across New York State, the Nation, and the Globe. New York State is currently undergoing huge changes with Governor Cuomo’s comprehensive energy strategy, Reforming the Energy Vision (REV), which is a major overhaul of the state’s current approach to energy efficiency and programs. REV is designed to help consumers make better and more informed energy choices, enable the development of new energy products and services, protect the environment, and create new jobs and economic opportunity throughout New York State. Very recently on the national level, the Senate on April 20th 2016 overwhelmingly passed the Energy Policy Modernization Act, which included language from the SAVE Act and includes many substantial energy efficiency provisions. And beyond the United States, a Global “Universal Climate Agreement” was reached on December 12, 2015 in Paris to support the creation of growth, innovation and solutions for a low-carbon world.

A home energy score brings these efforts to homes and the homeowner, buyer, and renter level in a real, tangible way. The score or rating allows the market to view the estimated annual energy use of a home in one comparable metric. Scores, or ratings, have become standard practice for many items in our lives: we have miles-per-gallon ratings for cars, energy guide information for major appliances, credit scores for our finances, and cholesterol levels for our bodies. (Figure 2). The value of a score is that it provides a quick, consistent, and clear way to see where something falls in comparison with others or with a certain standard or goal. Awareness of a metric often inspires and allows for changing that metric. Without a home energy score, homes and real estate transactions lack a way to value or compare the energy efficiency of homes. Energy efficiency often becomes invisible. Home energy labeling and disclosure programs aim at making this information visible, giving homeowners more incentive to invest in energy efficiency.

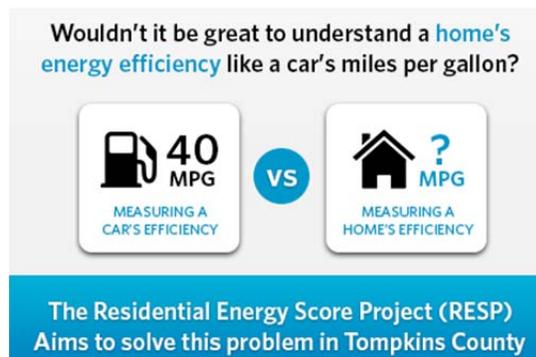


Figure 2: An energy score provides a simple metric to help understand the energy use and efficiency of a home.

The Residential Energy Score Project (RESP) team, a consortium of five (5) municipalities in Tompkins County, received a grant from New York State Energy Research and Development Authority (NYSERDA) to develop a Residential Energy Score and Disclosure Program. Current residential energy disclosure programs around the world use a range of approaches to evaluate the relative energy efficiency of a home and make this information available to relevant parties. A detailed review of these programs

² ~~Italicized words~~ Words in SMALL CAPS are defined in the Glossary.

was performed as part of this project, and can be found in Attachment 2.

The momentum of labeling initiatives around the country is growing rapidly. Ratings are currently being adopted by a dozen or so states either as a regional pilot initiative or in some cases, like Vermont, Connecticut, and Massachusetts, as part of a state-wide home labeling program. While this concept is relatively new to policies in the United States, in some places like Denmark and the Australia Capital Territory, residential energy rating disclosure programs have been around for over 15 years.

Prior to completing this report, the Residential Energy Score Project Team completed over a dozen outreach events including: three (3) formal meetings with the project's Technical Advisory Committee, four (4) targeted meetings with representative realtors, two (2) meetings with the Tompkins County Climate Protection Initiative, one (1) public presentation, one (1) meeting with the County Assessment Department, and one (1) meeting each with the Ulysses Town Board, the Danby Town Board, the Ithaca Town Board, and the City of Ithaca Planning Committee. The team had two (2) meetings with the Tompkins County Council of Governments, one (1) meeting with Northeast Energy Efficiency Partnerships (NEEP), a presentation to the Northeast Home Energy Rating Systems (NEHERS) Alliance, and a meeting with Attorney Susan Brock to discuss legal issues surrounding a law or ordinance. Surveys were sent out following most of these events to solicit additional ideas and feedback.

The Technical Advisory Committee for the RESP is made up of experts from targeted industries of relevance to this project including realtors, lending officers, builders, raters, home performance professionals, engineers, brokers, utility representatives, and low income advocates.

After looking at numerous evaluations of existing energy disclosure programs, the following are the key recommendations for programs to be most effective:

1. Engage with local real estate agents and other stakeholders;
2. Create consistent targeted outreach via public communication, education, and marketing;
3. Rely on existing, nationally recognized rating systems, which ensures quality assurance;
4. Allow disclosure before or at time of listing to allow homeowners and buyers to use the information more effectively;
5. Link participants to appropriate resources to drive home efficiency improvements (contractors, incentive programs, do-it-yourselfers);
6. Create a strong implementation plan for confirming participation;
7. Have a quality assurance process in place;
8. Create a written plan for evaluating and updating the *PROGRAM*; and
9. Work toward wide-spread adoption by the majority of homes.

3. Program Overview

In this *PROGRAM*, a certified energy rater would visit a home to perform a rating, or a comprehensive home energy assessment, which often includes diagnostic testing using specialized equipment, such as a blower door, duct leakage tester, combustion analyzer and an infrared camera, to evaluate the home's

energy related assets. A complete list of the data collected during these inspections can be found in Attachments 4 and 5. The information collected during the rating can be used to not only generate a score, but also to calculate estimated annual energy costs for the home and provide recommended energy improvements. This information is delivered to the homeowner, builder, Realtor, or other interested party, on a report or LABEL. The LABEL provides valuable information on how the home is operating from an energy use standpoint and where improvements can be made to increase the homes energy efficiency. The label and score can be made available to the public at the homeowner's discretion, at time of sale or rental. When a house is for sale, a LABEL communicates investments made that may not be visible, such as added insulation, and potential home buyers can anticipate the costs of energy bills and future efficiency upgrade needs. The label gives Realtors a standard way to discuss the energy features of a home. Northeast Energy Efficiency Partnerships (NEEP) explains how these policies provide needed information to consumers, "like miles-per-gallon ratings on automobiles, or nutritional labels on food, energy performance disclosure gives consumers the tools to make informed choices and inform themselves upfront about poor buildings and building components, higher-than-anticipated energy bills, discomfort, or unplanned renovation needs." (Northeast Energy Efficiency Partnerships, 2013)

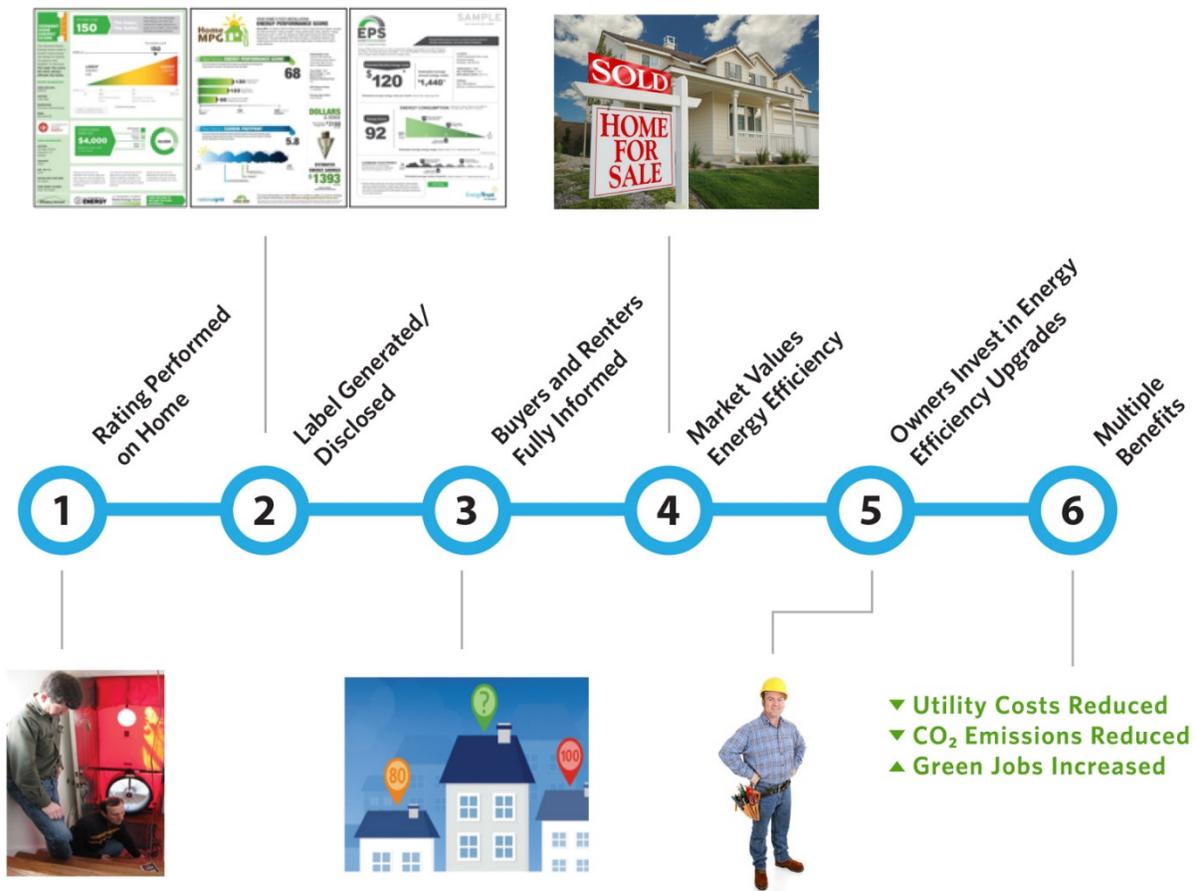


Figure 3: A step by step look at the Home Energy Score Process

4. Program Elements

4.1. Home Rating

At the heart of this program is the use of a home energy rating, specifically an asset rating, which evaluates the energy efficiency of a home. The rating is intended to provide a simple way for homeowners and buyers to distinguish between high efficiency homes and lower efficiency homes and to provide guidance on the savings potential of various improvements. A rating is done by a trained and certified rater, who will spend roughly two (2) hours in an existing home taking measurements and performing diagnostic tests, such as the blower door test, to determine the leakiness of the structure. This information is then entered into computer simulation software to create an energy model of the home and determine, among many other things, the rating. In addition to the rating, the rating software may be used for code compliance, estimated annual energy use, and potential savings as a result of home performance improvements. Energy efficiency and use in homes is complicated, and there are many ways to think about and capture energy savings and efficiency of a home, such as behavior change (turning down the thermostat), embodied energy (looking at the sum total of the energy necessary for an entire home life-cycle), and energy source (coal vs. wind). In this project we focus on the efficiency of the assets that make up the structure itself, such as insulation, infiltration levels, and heating equipment, and use this to estimate the average energy use per year, assuming typical fuel prices, typical occupants, and typical weather³.

4.1.1 Rating System

Asset ratings create a score by evaluating a home's actual physical structure and mechanical systems, and major lights and appliances. The physical structure includes size, window properties, insulation levels, shading, infiltration, and home location, to name a few. Mechanical systems include the home's heating, cooling, and hot water heater, as well as some large appliances. A rating is a similar process to what most people know of as an energy audit, however, unlike an audit, a rating provides a clear metric to compare homes to each other and generally involves stringent third party quality assurance and oversight of the rating data and the individual inspector's certification. An audit often focuses on a specific occupant and opportunities for that occupant, whereas a rating focuses more on the structure itself, independent of the current occupant. A rating requires additional data collection beyond what is needed for a typical NYSERDA home performance or weatherization program. Homes participating in NYSERDA's low-rise new construction program already receive a rating, as described below.

An *ASSET RATING* removes occupant behavior and use patterns from the assessment, allowing the energy performance of buildings to be easily compared to each other for a prospective buyer. Currently in New York, the "New York State Truth in Heating Law," which has been in effect since 1981, requires sellers

³ Both rating systems use national standard assumptions about the standard or average occupant, weather averages for a specific area, and usage assumptions. The actual assumptions used can be found in the Mortgage Industry National Home Energy Rating Systems Standards for HERS: http://www.resnet.us/blog/wp-content/uploads/2015/11/RESNET_Mortgage_Industry_National_HERS_Standards.pdf or the DOE Home Energy Score <http://energy.gov/eere/buildings/home-energy-score-calculation-methodology>

and landlords to provide prospective buyers and tenants with the past two years of utility bill information upon request. This can be informative, but energy use in a particular home can vary significantly depending on who lives there and how they operate the home. The *ASSET RATING* removes this wild card. *ASSET RATINGS* are used in other national labeling and compliance programs across the nation, such as ENERGY STAR homes, and come with third party certification and quality assurance (QA).

The nationally accepted rating system used for residential new construction is the *RESIDENTIAL ENERGY SYSTEMS NETWORK (RESNET) HOME ENERGY RATING SYSTEM INDEX (HERS INDEX)*. More than one million new homes have been rated using HERS since 1995. The HERS Index is the nationally recognized system for inspecting and calculating a home's energy performance. It is the standard used to qualify homes for the ENERGY STAR, Passive House, LEED, and the DOE Zero Energy Ready Home. A HERS rating is required for homes participating in NYSERDA's low-rise new construction program. In April of 2016, New York joined nine other states and adopted the voluntary performance compliance path for the 2015 International Energy Conservation Code (IECC) State Energy Code, which will go into effect in October of 2016. Currently New York is on the 2009 IECC. This Energy Rating Index Compliance Option establishes a new voluntary performance compliance path for the 2015 version of the IECC. This means that a home can meet the state's energy code by obtaining the required HERS Index. The HERS Index can be used on single family buildings, duplexes, townhomes, and units within multifamily buildings.

While the HERS Index is well suited for very high-efficiency homes and new construction, the rating system used for most existing homes of average to low energy efficiency is the *U.S. DEPARTMENT OF ENERGY'S (DOE) HOME ENERGY SCORE (HES)*. HES, launched in 2012, is an asset rating developed to show energy efficiency and opportunities for improvement in existing homes. As of January 2016, more than 32,000 homes have received the Home Energy Score. HES is currently being adopted by a dozen or so states either as a regional pilot initiative or, in some cases, as part of a state-wide home labeling system. Connecticut launched the nation's first statewide Home Energy Score Program in April of 2015.

The team performed considerable research to determine the appropriate rating system(s) to use for the program. More detailed information on programs across the country that are considering, or have already implemented, residential energy rating and disclosure programs can be found in the Residential Energy Score Project's "Report on Existing Home Energy and Disclosure," included here as Attachment 2. The report looks at these programs to see the various ways energy efficiency has been evaluated and how and when this information has been made available to influence consumers. Based on this research, the project team recommends generating a "Tompkins Residential Energy Score" from either of the two national rating systems - the Residential Energy Services Network's Home Energy Rating Systems Index (HERS Index) and the Department of Energy's Home Energy Score (HES Score) for this project.

Both the HERS Index and the HES Score provide a standardized, nationally recognized method for conveying the energy performance of a home. Using both systems will allow the program to capture both new and existing homes, single-family detached homes, as well as units in multifamily buildings. These systems come backed with quality assurance oversight, training options for certifying Raters, and connections to national programs, such as ENERGY STAR and LEED. For detailed information on the data

collected during a Home Energy Score rating see Attachment 4, “Home Energy Scoring Tool Data Collection Sheet” and for a HERS Index Rating Attachment 5, “RESNET HERS Index Rated Features.”

4.1.2 Recommendations

The program should use both the HERS and the HES rating systems to generate a projected Millions of British Thermal Units per year (*MMBTU/year*) value. Using two rating systems is optimal for greatest participation in the program, while still providing the value of one consistent number for comparison across homes.

4.1.3 Timing

A home rating can take place at any point in time, but to maximize the benefit and limit the interruption to occupants, the program would encourage ratings at significant points in the homeownership life cycle. For an existing home, these points include: time of home energy audit; HVAC tune up; retrofit or renovation; time of home inspection prior to home sale; time of code inspection for renovations or additions involving a building permit; and the time of real estate transaction such as listing or sale. For new construction, the rating often involves at least one inspection during construction and a final inspection once built.

These all represent times when an outside agent is in the home performing evaluations or work and a rating could be an added service without a lot of added time or resources. The professionals performing these other services are also great candidates to become certified raters and expand their business offerings. These are also times when homeowners are considering home improvement options and could benefit from information that would help them understand the opportunities for energy related improvements and influence the rating. Feedback from the project’s Technical Advisory Committee suggested that soon after a home purchase is the perfect time to offer homeowners a rating because that is when people are thinking about making home improvements. Many programs across the nation that are adopting home energy rating and disclosure programs are bundling them with either the real estate transaction or home performance programs.

4.1.4 Recommendations

The program should incorporate ratings at any time, but encourage ratings at significant points in the homeownership life cycle. These points include: time of home energy audit; HVAC tune up; retrofit or renovation; home inspection; code inspection; time of real estate transaction such as listing or sale; and new construction.

4.2. Tompkins Residential Energy Score

The purpose of the *TOMPKINS RESIDENTIAL ENERGY SCORE*, or “*THE SCORE*,” is to provide one metric for understanding and comparing the energy use of homes and provide some context for where a home lies in a range of homes. After considering public feedback and research done on this topic, a score based on millions of British Thermal Units per year, or *MMBTU/year*, is recommended for this project. *MMBTU* is the industry standard for discussing units of residential home energy use, and is in line with other scoring/labeling efforts, such as the Vermont example (Figure 5). A lower score is associated with lower *MMBTUs*, indicating lower energy use and anticipated utility costs. Using a score based on an energy

unit is beneficial because it does not change with the changing cost of fuels. Estimated energy costs can be generated from the rating based on the current or area average fuel rates at the time of the rating and can be revised later if rates change. While annual energy **cost** is one of the primary interests of prospective buyers or renters, the Score based on energy, rather than dollars, is more meaningful for comparing the energy **use** of one home to another. If a homeowner generates 100% of the energy used on-site, looking at costs could be very misleading when trying to understand the expected energy use of the home.

Using *MMBTU/year* also allows translating different rating systems into a single score. When looking at the HERS Index (Figure 4, left), a lower number is associated with higher energy efficiency. In contrast, the *DOE HOME ENERGY SCORE* (Figure 4, right) uses a higher number to indicate lower energy use. In addition, both scores are based on different assumptions and used for different purposes, which makes comparing one to the other impossible. For example, one cannot say that a HERS Index of X is equal to a HES Score of Y. Both rating systems, however, use software that generates estimated *MMBTU/year* for the home based on the assets of the home evaluated in the rating. Using an *MMBTU/year* score allows the incorporation of either system, and includes all residential housing stock in the program with the same scoring system.

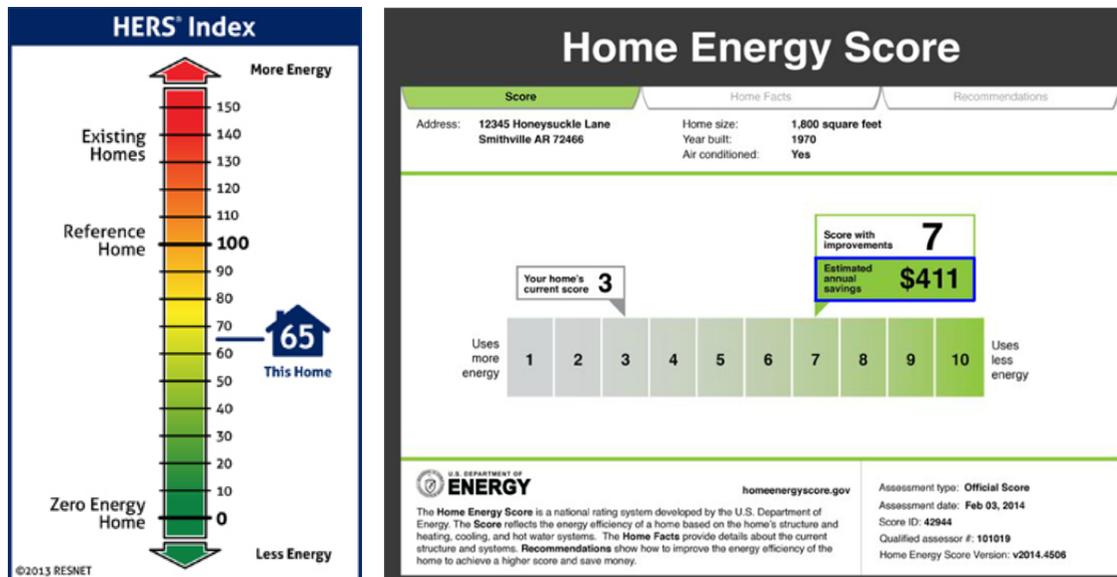


Figure 4: The RESNET Home Energy Rating Systems Index vs. the DOE Home Energy Score

Energy use in *MMBTUS* can be expressed in two distinct ways: “*SITE ENERGY*,” which is the energy used at the home and measurable by the utility meter or fuel tank, and “*SOURCE ENERGY*,” which includes all energy used in generating and delivering the energy to the home. Another way to think of *SOURCE ENERGY* is that it includes where the energy came from (e.g. New York, Canada) as well as what form it was in (e.g. wind, coal, oil) before it arrived on site. *SOURCE ENERGY* takes into account transmission losses and the efficiency of creating that form of energy. For example, electricity use measured at the home (*SITE ENERGY*) does not include the raw energy used to create the electricity in the first place. When we create

electrical power, approximately two thirds of the power is lost. The inefficiencies involved in producing and distributing electricity are significant, but electric heat and appliances are nearly 100% efficient at transferring heat within the home. Source-based energy use factors are applied to the *SITE ENERGY*, dependent on fuel type, to account for generation and transmission losses or the energy used to extract and deliver the fuel. While there are benefits to using each method, the lessons learned by the Vermont Working Group with their statewide labeling initiative should be considered. They eventually went with *SITE ENERGY* “to keep the explanation of the energy score relatively simple, avoid controversies regarding which source-based factors to use, and in order to give full credit to on-site renewables.” (Energy Futures Group, 2013)

Credit for renewables and on-site energy generation was identified as an important element during outreach for this project. The current recommendation for this project is to use estimated *MMBTU/year* to include both new and existing home rating systems, and display these in *SITE ENERGY* units, unless an appropriate alternative way to credit or highlight renewables in the program is identified. The presence of renewables and onsite power generation can be included on the label, as described later in this document.

4.2.1 Recommendations:

The program should use the *MMBTUS* derived from either the HERS Index or the HES Score to convert the rating data into one comparable number, creating the home’s *TOMPKINS RESIDENTIAL ENERGY SCORE*. The Score would range from roughly 0-200+, and would reflect the projected annual site energy use of both new and existing homes.

4.3. Home Energy Label

Once a rating is completed on a home, the calculated Score and other relevant information should be presented on a *LABEL* or report. While the rating itself, in the absence of a *PROGRAM*, can produce a score, the *PROJECT TEAM* is suggesting a *LABEL* that would be more relevant and informative than just a number. A label provides a visual and a descriptive explanation of what the score means in terms of energy use, estimated energy costs, and where the score falls in relation to other scores in the area. It can also guide the owner by suggesting cost effective improvements or list the biggest energy uses in the home. A label would allow for including ratings on the entire range of housing stock in Tompkins County (new and existing, high and low efficiency), and serve to facilitate home energy improvements. To view more detailed information on the local housing stock, see Attachment 3, “Review and Analysis of Preliminary Data in Tompkins County.” A *LABEL* provides information to help understand the home’s score, and provides additional relevant information and resources, such as access to local weatherization and assistance programs, resources for homes in the historic district, or home performance contractors. While the Score of *MMbtu/year* is a projected annual energy use, other information such as the presence of renewables, an efficiency metric such as *MMbtu/year per square foot*, and size of the house can be added to the label.

It is envisioned that this *LABEL* could be used in various ways - for instance as a helpful resource for homeowners considering making investments, or as a document to display on a sign or electrical panel - but that it would be used primarily in the real estate market to share energy information about homes

that are for sale or rent. On the following two pages, Figure 5 shows an example of a *LABEL* used in designing the Vermont Home Energy Profile as part of their statewide labeling initiative. Vermont, Massachusetts, and Connecticut are all creating or already have in place statewide voluntary energy scoring and labeling programs of existing homes.



THIS HOME'S EXPECTED ENERGY USE

93

MMBtu ANNUALLY

THIS HOME'S EXPECTED ENERGY COST

\$3,137

ANNUALLY



HOME ENERGY SCORE

9

/10

TURN THE PAGE TO SEE HOW YOU SCORE NATIONALLY.

The Vermont Home Energy Profile is a report on three related components of home energy: usage, cost, and efficiency. The profile is based on the home's structure and heating, cooling, and hot water systems. Energy usage and costs are estimates only. Actual usage and costs may vary and are based on many factors such as weather and occupant behavior. See reverse side for details.

93

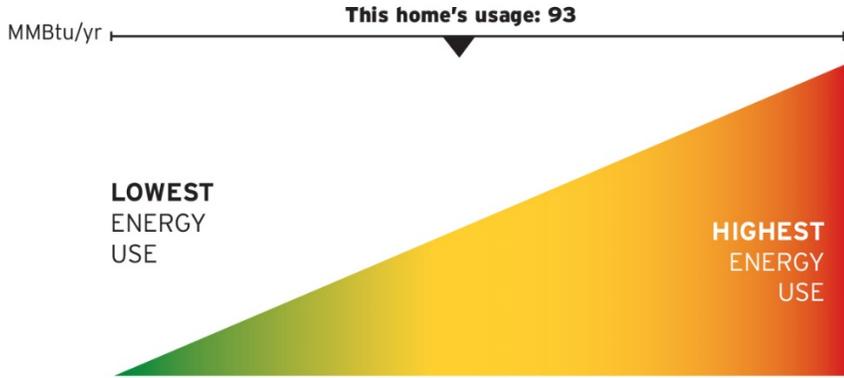
MMBtu

Expected Annual Energy Usage

This scale represents how much energy your home is expected to use over the course of a year, placed on a scale of 0 to 200+, where zero energy usage is most efficient.

MMBtu/yr

This home's usage: 93



LOWEST ENERGY USE

HIGHEST ENERGY USE

MMBtu/yr

0

40
High Performance home

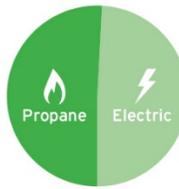
111
Avg. VT home
Built to energy code (RBES 2011)

200+

Expected Annual Energy Costs*

The breakdown of fuel usage is based on the fuels used in this home and average fuel costs as of June 2015.

<p>Propane \$1,578</p> <p style="font-size: 0.8em;">631 gal \$2.50 / gal</p>	<p>Electric \$1,559</p> <p style="font-size: 0.8em;">10,396 kWh \$0.15 / kWh</p>
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Energy Features that Contribute to this Home's Profile

Envelope Tightness: 650 CFM50 Attic Insulation: R-38 Wall Insulation: R-19	Primary Heating System/Fuel: Propane Boiler Primary Heating System Efficiency: 88 AFUE Water Heating: Propane, Indirect	Windows: Double-pane
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HOME INFORMATION

LOCATION:
123 Main Street
Anytown, VT
05000

YEAR BUILT:
2005

SIZE (SQ. FT.):
3,029

REPORT INFORMATION

PROFILE ISSUE DATE:
X/XX/20XX

ASSESSOR:
John Doe

ORGANIZATION:
Common Sense Audits

PHONE:
888-921-5990



Tompkins Residential Energy Score Program and Implementation Plan

HOW DOES THE VERMONT HOME ENERGY PROFILE WORK?

Vermont Home Energy Profile is a tool to assess a home's energy consumption and average associated costs. The lower the expected MMBtu on a scale of 0-200, the better! A low MMBtu identifies a home as energy efficient with a smaller carbon footprint and lower energy costs. The Vermont Home Energy Profile also allows for the comparison of one home's energy costs and use to another home. The MMBtu calculation is based on a home's size, insulation levels, draftiness, heating and cooling systems, and hot water heating efficiency. This profile is based on the building features themselves, not on how a particular occupant uses the building. Number of occupants, behavior, weather, indoor temperature, lighting and appliance usage, are standardized to calculate normal, average energy use based on the assets which make up the home. A home's actual energy use will vary with conditions such as occupancy, behavior, weather, and changes to the home. Assessments are completed by qualified Assessors who must meet DOE certification requirements.

ASSUMPTIONS

Average Vermont fuel prices are used to generate the estimated annual energy costs presented in this score. Values are obtained from the Vermont Fuel Price Report. The following table shows pricing assumptions used in this report.

COMPARING THE COST OF HEATING FUELS						
TYPE OF ENERGY	BTU/UNIT	TYP EFFIC	\$/UNIT	\$/MMBTU	HIGH EFFICIENCY	\$/MMBTU
Fuel Oil, Gallon	138,200	80%	\$2.67	\$24.16	95%	\$20.35
Kerosene, Gallon	136,600	80%	\$3.24	\$29.60		
Propane, Gallon	91,600	80%	\$2.50	\$34.14	93%	\$29.37
Natural Gas, Therm	100,000	80%	\$1.43	\$17.91	* 95%	\$15.08
Electricity, Kwh (Resistive Heat)	3,412	100%	\$0.15	\$43.46		
Electricity, Kwh (Cold Climate Heat Pump)	3,412		\$0.15		240%	\$18.32
Wood, Cord (Green)	22,000,000	60%	\$227.14	\$17.21	*	
Pellets, Ton	16,400,000	80%	\$294	\$22.41	*	

* The natural gas price is based on the rate effective 5/6/15. *Wood green and Pellets updated 9/19/14. Current fuel price reports can be obtained from the Public Service Department website http://publicservice.vermont.gov/publications/fuel_report

REFERENCE HOMES FOR EXPECTED ENERGY USE SCALE

LOWEST ENERGY USE - A highly efficient home that produces as much energy as it consumes is considered a Net-Zero Home. This home would have a 0 score.

AVERAGE VERMONT HOME - An average Vermont home is defined as 1,972 square feet, oil boiler and integrated hot water, built to Vermont's minimum energy code specifications (RBES 2011).

HIGH PERFORMANCE HOME - Efficiency Vermont's highest performing residential new construction service tier. These homes can be up to 75% more energy efficient than a home built to code.

HIGHEST ENERGY USER - Some of the most inefficient homes in Vermont can consume over 200 MMBtu/year in total energy.

Figure 5: Image of One Label Design Considered in Vermont

USEFUL TERMINOLOGY

MMBTU - 1 MILLION BTUS - A btu (British Thermal Unit) is a unit of energy, specifically the amount of energy required to raise 1 lb. of water 1 degree Fahrenheit. For reference, this is approximately the amount of energy released by burning 1 wooden match. 1 MMBtu = 7 gal fuel oil, 10 therms of natural gas, 11 gal of propane, or 293 kWh of electricity.

ENERGY CODE - Vermont's Residential Building Energy Standards (RBES) were enacted in 1998. These standards set minimum energy performance guidelines for new construction and renovation building features. For more information see: www.publicservice.vermont.gov/topics/energy_efficiency/rbes

ADDITIONAL RESOURCES

CARBON FOOTPRINT

As it relates to this profile, the amount of CO2 (in lbs.) released into the atmosphere per year as a result of the energy used to operate your home. Total carbon footprint includes the products we consume as well as transportation and other activities. You can calculate your carbon footprint from the data supplied by your Vermont Home Energy Profile. Learn how by visiting: www.epa.gov/climatechange/ghgemissions/ind-calculator.html

LOCATION EFFICIENCY

Curious how your neighborhood ranks in terms of total cost of home ownership and transportation? Take a look at the Center for Neighborhood Technology's Housing and Transportation Affordability Index at <http://htaindex.cnt.org/map>

ENERGY EFFICIENCY PROGRAMS

The following programs can help get you on the path to making your home more energy efficient.

Efficiency Vermont • 888-921-5990 • www.encyvermont.com

Vermont Gas Systems • 802-863-4511 • www.vermontgas.com

Burlington Electric Department • 802-865-7342 • www.burlingtonelectric.com

NeighborWorks of Western Vermont • 802-438-2303 • www.nwvvt.org

Vermont's Weatherization Program • www.dcf.vermont.gov/oeo/weatherization



Efficiency Vermont was created by the Vermont Legislature and the Vermont Public Service Board to help all Vermonters reduce energy costs, strengthen the economy, and protect Vermont's environment. For more information, contact Efficiency Vermont at 888-921-5990 or visit www.encyvermont.com.

4.3.1 Recommendations:

The program should encourage, and allow an easy option for, homeowners to disclose the Score and Label generated from the rating at time of sale or rental. However, no information collected during a rating can be made available to the public without the written permission of the participating homeowners. The program should make the Score associated with each address publicly available. All other information collected could be made available to the public with the written permission of the participating homeowners. Based on the Residential Energy Score Project's community outreach and feedback throughout the project, the *label* for this project should, at minimum, include the following in order to be most effective:

1. The home's *TOMPKINS RESIDENTIAL ENERGY SCORE*;
2. Where the home falls on a continuum of Scores;
3. Estimated annual home energy costs;
4. The home's efficiency in units of MMBtu/square foot;
5. The presence and source of onsite power generation, such as solar and wind;
6. If the home is located in a historic district;
7. Basic home information collected by the rater (address, square footage, year built);
8. Information on where to access local support such as financial incentives and subsidies to support low-income population and to improve a home's score; and
9. Date when energy score rating was performed.

Numerous state and local programs exist to support low-income and low-to-moderate income homeowners access resources and financial support for home energy improvements, however many homeowners are not aware of them or how to participate. The back of the label can provide basic information on what these programs are and how to contact. For a list of programs and financial support, see Attachment 11, "Related Programs and Financial Mechanisms in New York and Tompkins County."

Along with the date of rating, a disclaimer or language should be included that "this rating represents the state of the house on *Date* and is subject to change with major home renovations, replacement of major appliances, and any significant change to the home's structure."

When generating the annual home energy costs, or costs by fuel type, the fuel price assumption should be listed on the report. The team should also consider using the state-level fuel and electricity rates available from Energy Information Exchange (EIA) by eGRID subregion. Emissions & Generation Resource Integrated Database (eGRID) has a more comprehensive look at the environmental attributes of electric power systems in different regions. Also possible to include are occupant behavior assumptions, a link to assumptions, and/or a statement that annual energy use is based on typical occupants, occupant behavior, and meteorological year.

4.4. Cost

The cost of hiring a Rater to perform the Home Rating may vary from house to house, and from one rating provider to another, but based on the team research, the expected range is \$300-\$500 per home

if performed independently (not as an add on to another service). The cost could be less if the rating is performed at the time of another service, such as a home energy audit, or home inspection. The rating process involves 2-4 hours within a typical home, followed by 1-4 hours of computer modeling and reporting. The time involved depends on the size and complexity of the home and the rating system used (HES or HERS). All certified raters must belong to a provider, and fees cover software licensing, mandatory quality assurance inspections and registering the ratings with the national database.

To encourage voluntary participation, the cost of the ratings could be covered by outside funding or be subsidized to reduce or eliminate the cost to homeowners. Outreach and education in the community will help individuals, businesses, non-profits, agencies, and municipalities understand the value of having multiple homes scored. These entities may be willing to consider incentives to fund part of the rating costs. There is value to multiple groups in having homes scored in a community. These benefits, described below, would be communicated to these groups as part of the outreach around the program, and they would be encouraged to consider incentives to fund a part of the rating costs. Pursuing funding options and partnerships through local and statewide agencies should be part of the phased roll-out of the program. Some of these agencies include NYSEG, NYSERDA, municipalities, local corporations, and local foundations.

4.5. Value

The Residential Energy Score Project Team sees the project providing value to many groups. Some of these benefits are described below.

1. Homeowners: This rating will identify energy and cost-saving priorities for home energy improvements. Homeowners will receive recognition and visibility of existing energy efficiency features and improvements in the real estate market.
2. Homebuyers and Renters: The Score and Label will help consumers avoid the “surprise” of higher-than-expected energy bills or unplanned renovation needs. The program will provide consumers with more information about the projected operational costs of owning the houses under their consideration as well as opportunities for improvement. Expected monthly energy costs is a big piece of missing data for many new homeowners and renters in Tompkins County, many of whom move from areas that are not climatically similar to the Northeastern United States, or don’t have as old of a housing stock. On March 29th of 2016, Fannie Mae announced their new “HomeStyle Energy Mortgage” loan designed to support borrowers in their efforts to increase energy efficiency and reduce utility costs for their homes. In order to qualify for this loan, a home must have either a HES or HERS Rating performed. An FAQ for the new HomeStyle Mortgage is included with this document as Attachment 6 as well as the announcement as Attachment 7.
3. Realtors: Realtors will benefit from more credible information for their clients. They will be “better informed on documenting and quantifying how energy efficient a home is, allowing them to more confidently market energy efficient features.” (American Council for an Energy-Efficient Economy, 2014) In Chicago, preliminary analysis of an energy disclosure policy found

that home listings that disclosed energy costs spent less time on the market and had a higher closing rate, regardless of how much or how little energy they used. (Elevate Energy, 2014) This supports the idea that consumers value more information, even if that information is not favorable. There is value in understanding the full picture of home ownership. During outreach for this project, a Realtor reported that she often hears from newcomers to the area that they are concerned about costs to operate inefficient old homes in Tompkins County. This program would help explain and reassure people that some of these old houses have been retrofitted and are indeed energy efficient.

4. **Policymakers:** Policymakers will get more access to data on the energy use of the existing building stock, to both inform future policy development and track progress toward meeting local climate and/or energy reductions goals for buildings. The program creates opportunities to target homes in need and create more synergies between policies, programs, and the actual housing stock. Over time, ratings also allow for tracking improvements and savings.
5. **Home Performance Contractors and Auditors:** These trades will benefit from a new business opportunity. They have the option to become raters themselves and add this service to their existing service as a value-added offering. They may also benefit from the assumed increase in demand for home improvements. A rating pre and post energy efficiency retrofit work is a great way to validate the results beyond a simple payback.
6. **Builders:** Builders can benefit by being better prepared for code and future code requirements. The rating compliance option is part of the 2015 energy code, which newly permitted homes must comply with starting in October of 2016, and has already been written in to the 2018 IECC language. Having a rating on a new home also gives energy efficient builders recognition for a home performing above code requirements.
7. **Related Agencies:** Having the rating data stored and easily accessible supports other agencies that can benefit from accessing rating information, outside of a proposed sale of a home. These agencies include the Tompkins County Department of Assessment, municipal planning boards, and home performance programs. Activities associated with this might include supporting energy code compliance, or making better energy policy decisions about a given area.
8. **Everyone:** For the entire population, the Tompkins Residential Energy Score would give people a common language to discuss energy efficiency and energy use in homes, and create a population more aware of its energy consumption. This serves as a base for discussing and encouraging efforts to increase energy independence and economic security as a community and lower greenhouse gas emissions.

4.6. Program Administration and Design

Although ratings are already available and happening, there is value in having a local *HOME ENERGY RATING* and Disclosure *PROGRAM*. Working with two existing national rating systems and developing our own program gives us the most advantages. The proposed program, ideally implemented by one central,

local agency, would provide one consistent Score, the *TOMPKINS RESIDENTIAL ENERGY SCORE*, (derived out of either the HES or HERS rating system) and a locally meaningful *LABEL* to provide context. The Program would provide important infrastructure, including a centralized database to track all Scores and allow for easy transfer to a Multiple Listing Service (MLS). The central database allows controlled access to data to compare and verify Scores, the ability to analyze the set of Scores to educate policy decisions moving forward, and the ability to evaluate and determine program effectiveness.

The central agency, or *PROGRAM IMPLEMENTER*, would complete the program design and drive the process forward. An energy efficiency program implementer generally oversees and facilitates the local education and marketing efforts on the value of participation, facilitates training of local certified raters, generates the Score and *LABEL*, provides quality assurance, engages with local contractors and real estate professionals, and provides periodic evaluations of the program. This role of program implementer and the details of the program design are described in more detail in this report in Phase 3.

Goals for Effective Program Administration

The infrastructure used to oversee, process, and support the *PROGRAM* should address four keys goals:

1. **Cost Effectiveness** - The overall administrative process of performing the rating, generating the *LABEL*, and getting it into the MLS must be cost effective. If the cost is too high, then there will be pushback from homeowners and Realtors. A high cost for a voluntary rating will result in little participation.
2. **Quality Assurance** - The system needs to establish confidence in the rating numbers. A system with little or no quality assurance will eventually reduce consumer confidence in the usefulness of the Score.
3. **Time Efficiency** - The administrative process needs to be timely. A synchronous process where ratings can be done along with other events, such as energy retrofit or solar installation, and data stored for retrieval when the house is to be sold, will also help reduce time pressure to deliver a rating when a house is going on the market. If the rating takes place at some point during the home sale process, a fast process will reduce the chance that the rating is responsible for delays in sales. Selling a house has many steps and there is reluctance to add to this burden.
4. **Sustainability** - The administrative process needs to be sustainable. Startup costs may be more significant than can be funded by transaction fees, and external funding may be needed. Ongoing administrative costs will need a source of continued revenue, most likely through transaction fees.

4.7 Consideration of Concerns

In presentations to the public and various groups of stakeholders, several issues were raised as concerns by both the RESP team and feedback from the Technical Advisory Committee and public about the design and implementation of the program. These include:

1. Consider how the program may impact a home's assessed value and taxes;

2. Avoid creating disproportionate negative impacts on the low income population;
3. Homeowner privacy concerns; and
4. Considerations for historic districts.

These concerns are described below, along with related information relevant to this project.

1. Home value: Importance of considering the impact of a score on the assessed value and sale price of a home.

Concerns were expressed that a Score may affect the assessed value of a home and/or the sale price of a home, with possible implications on property taxes.

Assessed value is based on market forces; values are adjusted when there are obvious changes in the local housing market that can be applied across similar properties.

Based on discussions with the Tompkins County Department of Assessment (“Assessment”), energy efficiency features historically have not affected market value. There are a number of barriers that would have to be overcome before a home energy score could be factored into an assessment or show an effect on assessed value:

- Assessment would need to have access to and confidence in the energy score.
 - a. For example, if score data is stored in MLS, Assessment does not have an easy, automated way to access that information. Assessment does not have access to disclosure documents from sellers, so if that technique is used, a system may be needed to share the score with Assessment.
 - b. Assessment would also need to be confident in the quality and validity of the data because the data are coming from a third party and not generated by Assessment staff.
- Assessment would need a system to track and manage energy score data.

The New York State Department of Taxation and Finance specifies what data are collected and stored in the assessment database. Individual county or municipal assessors cannot add fields, and therefore there is no way to collect or store additional information, such as an energy score, in its Image Mate database. A separate database would need to be developed, which would add complexity to the process of determining assessed value.
- In order to find a correlation between variations in energy score and variations in value, there would need to be enough homes scored and sold in same market area. “Enough” could be a small number of homes in one area, but the difference in sales price would have to be large enough to appropriately quantify and attribute to the score.
- If in the future there is a sale price change that can be attributed to the energy score, Assessment would need to develop a method to apply value changes to homes without a score.

Concerns were expressed that a Score may affect the assessed value of a home and/or the sale price of a home, with possible implications on property taxes.

Tompkins County Department of Assessment staff made it clear that a Tompkins Residential Energy Score, or any home energy rating, will not affect the assessed value of properties now or in the foreseeable future. Assessed value is based on market forces; values are adjusted when there are obvious changes in the local housing market that can be applied across similar properties. Until ratings are extremely widespread — common enough to show specifically how a good rating, bad rating, or no

~~rating at all impacts market value—it will be impossible to apply the results equitably across all properties in the County, according to the Department of Assessment.~~

~~Furthermore, the New York State Department of Taxation and Finance specifies what data are collected and stored in the assessment database. Our County Department of Assessment cannot add fields, and therefore has no way to collect or store additional information such as an energy score in its Image Mate database.~~

~~It is worth noting that energy efficiency upgrades such as a new furnace, or increased insulation, are treated as normal maintenance, and do not influence the assessed value of a home.~~

Regarding sale price, a Score will be only one factor among many that a prospective buyer will consider, along with other important information like location, school district, size, acreage, kitchen design, or age. Although there are reports that show that homebuyers are willing to pay more for **newly-built** homes with an energy efficiency **certification** such as Energy Star or LEED for Homes, research conducted as part of this project found no evidence of a relationship between changes in a home's energy rating score and changes in its sale price. In other words, no indication was found that a home with a better (or worse) score would necessarily yield a higher (or lower) sale price. However, there are other benefits to obtaining a score. As noted in the "Realtors" segment of section 4.5, above, there is evidence that disclosing a score, even if the score is unfavorable, helps to sell a home. The information itself, whether positive or negative, is helpful to the buyer. It is hoped that as scores become widespread, awareness of the energy use of a home will become part of a buyer's informed decision making and that we will have more energy conscious and informed consumers in the area.

2. Low-Income residents: Importance of avoiding disproportionate negative impacts on the low income homeowner and renter population.

Concerns were expressed that low-income homeowners whose homes score poorly, but who cannot afford to do the upgrades that would result in a better score, would therefore not be able to sell their homes.

Issues related to home value and salability are addressed above. The concern that low-income homeowners may not be able to afford energy efficiency upgrades will be addressed by emphasizing the availability of several programs for low-income people to help pay for, or fully subsidize some upgrades.

[Attachment 11. Related Programs and Financing Mechanisms in New York and Tompkins County contains an example of information that could be used on the Home Energy Label and in outreach efforts for the RESP program.](#) The RESP Program will also create ties with agencies that offer financial incentives to low-income people for energy efficiency upgrades, such as Tompkins Community Action and NYSERDA.

A score provides valuable information to help low- and middle-income home buyers and renters by giving them more information about the energy use and potential utility costs of a home they are

considering. This is currently a problem when renters unexpectedly face extremely high energy bills when they move in, which will have to be paid throughout the duration of their occupancy, or when home-buyers realize that they can only avoid high energy bills by either doing upgrades to the property or living in uncomfortable or unsafe conditions. The RES Program allows low-income buyers and renters to factor in the cost of energy to their decision about whether a prospective property will be affordable.

A recent report released by the American Council for an Energy-Efficient Economy, highlighted the higher-energy burdens (percentage of income spent on energy bills) experienced by low-income and minority households when compared to the average household. The report also highlighted that families with higher energy burdens are at greater risk for respiratory diseases, increased stress, and they can experience increased economic hardship and difficulty moving out of poverty. One strategy mentioned in the report for improving energy efficiency in low-income communities is incorporating energy efficiency education into program design. The report states that “state and local governments can set policy directives that support low-income energy efficiency, including disclosure and benchmarking policies for multifamily buildings.” (Drehobl & Ross, 2016)

3. Disclosure and Privacy: Importance of honoring people’s desire to control data about their lives.

Concerns were expressed about how the information collected would be stored and disclosed, and to whom.

Currently RESNET hosts a website that allows a home to be searched by address to find only the HERS Rating-Index number on a home, if it has received one. The site shows only the address of the house and the rating, no information about the homeowner, occupant, or other characteristics of the home is displayed. All RESNET Raters must abide by the RESNET Code of Ethics, which states: “Raters, Home Energy Survey Professionals or a rating organization shall not disclose information concerning the rating or home energy survey for a specific home to parties other than the client or the client's agent without the written permission of the client or the client's agent except to report to the Rating or Home Energy Survey Provider for the purposes of registration, certification or quality assurance.” The DOE Home Energy Score currently does not have a publicly accessible database.

There is already a lot of information about homes that could be considered private available to the public through the Department of Assessment’s online database, Image Mate, as well as through other sources. Image Mate Basic was created for use by the public and provides free and convenient access to real property information such as: the property address; a history of assessed value and sale value; year built; square footage; types of heating/cooling systems and fuel used; presence of a solar energy system; and general condition of the property. A complete list of data publicly available from the Department of Assessment can be found in Attachment 10. Any database developed for the Residential Energy Score project will not add significantly to the information that is already publicly available from other sources.

Research shows that for a rating project to have the greatest impact on affecting the housing market and driving energy efficiency, Scores need to be available to prospective buyers during the listing and sale process, preferably through realtors. Also, if the program is to be effective, citizens will need to become more aware of what a good Score is, and what Scores near-by homes or homes that are similar to theirs have. The program can collect data on participating homes to determine the average score, without making each individual home's score available to the public. Information from a home rating can be made available only with the homeowner's written permission. It will be important for everyone to have a sense about whether their home is "Average," "Below Average," or "Better than Average" in energy use. This awareness will help to encourage home-owners to get needed upgrades.

As the project moves into the implementation phase, the Project Team will request more input from the public to determine the exact means and limits of disclosure.

4. Historic Homes and Homes in Historic Districts: Importance of not jeopardizing homes that are protected because of their historical significance.

Concerns were expressed that homes with historical value or in a historic district have limited options to upgrade and improve a potentially poor score.

While some restrictions are placed on upgrades to homes in historic districts and homes protected as historic, many upgrades are still permitted, and many home performance options do exist. Resources for historic homes, including information about energy efficiency upgrades and related tax credits, are available on the City of Ithaca's Landmarks Preservation Commission webpage. The relevant link will be listed on the back of the Label.

During program design it will be important to continually consider these four primary topics that have been raised as concerns by the RESP team, the Technical Advisory Committee, and the general public. As implementation progresses, additional opportunities will be created for people to help craft strategies to make the RESP successful and meet these challenges.

5. Implementation

Staging the implementation in phases allows time to develop the *PROGRAM* in further detail, set up appropriate infrastructure, and prepare the market to engage successfully in the program. The six phases of implementation include the following:

1. Phase One: Project Team secures funding for development and implementation to move the program forward;
2. Phase Two: Project Team acquires a Program Implementer;
3. Phase Three: Program Implementer works with Project Team to complete the program and Label design, marketing and education plans, program infrastructure including data management, and evaluation plan;

4. Phase Four: Program is rolled out with a limited Pilot Program to determine how the program can be most effective;
5. Phase Five: Voluntary Program begins, accompanied by intensive marketing and education; and
6. Phase Six: Evaluation of program design and possibilities for improvement.

Below, the phases are presented in detail for a comprehensive understanding of the proposed program, implementation, and the ability to manage data and evaluate effectiveness.

5.1. Phase One: Secure Funding

Without adequate funding, the program cannot move forward. Funding options may include private foundations, NYSERDA, NYSEG, participating municipalities, community based non-profit groups, or other private organizations such as the National Association of REALTORS® (NAR).

Funding consists of stages:

1. Start-up funding to complete program and label design, set-up infrastructure, and provide training;
2. Funding for a pilot; and
3. Funding on an annual basis to run the program after initial launch.

5.2. Phase Two: Hire Program Implementer

Determining where to situate the project and what entity will be responsible for implementing the *PROGRAM* and tracking data is critical to initiating the project. The project team has identified Cornell Cooperative Extension of Tompkins County as one possible candidate.

The *PROGRAM IMPLEMENTER* would be responsible for:

1. Overseeing and Guiding Program Design;
2. Training and Policy Support;
3. Education and Outreach;
4. Program Optimization;
5. Program Quality Assurance;
6. Results/Data Tracking;
7. Facilitating Connections with Local Workforce and Home Performance Programs; and
8. General Program Administration.

5.3. Phase Three: Complete Program Design

Here we look in detail at the key elements related to designing and implementing the Residential Energy Score *PROGRAM*.

5.3.1 Design the Label

The creation and design of the *LABEL* needs to include stakeholder feedback, consumer input, and consideration of the local concerns and priorities. *LABEL* design should strongly consider feedback from public outreach for this project, as well as the lessons learned from the Vermont Energy Labeling

Working Group during their development of a voluntary residential building energy label. In Vermont, realtors, their regional Multiple Listing Service (MLS) organization, home performance contractors, the U.S. Department of Energy, different states and the public all provided feedback on proposed scoring metrics and label designs. (Energy Futures Group, 2013)

The Vermont group determined that a score in units of *MMBTU/year* for total estimated energy production based on an *ASSET RATING* was the best metric. The *LABEL* also included projected energy costs and a general description of the home. Ideas for the *LABEL* obtained during the RESP team outreach, outlined in the Home Energy Label Recommendations section of this report, section 4.3.1, should be included.

5.3.2 Design Education and Outreach Plan

Outreach and education must focus on the value of the rating to the homeowner, homebuyer, seller, buyer's and seller's agents, renter, and home performance contractors. It must also highlight the goal and need for carbon emission reductions and the role this project plays in both achieving that goal and in the creation of informed policy decisions going forward. For more details supporting outreach and education to different groups, review section 4.5 of this report.

5.3.3 Determine Alignment of HES to HERS Energy Predictions

Using two rating systems is key to allowing incorporation of existing market ratings on new construction, very high efficiency homes, and multifamily units via the *RESNET HOME ENERGY RATING SYSTEM (HERS) INDEX* and a feasible path for the average existing homes to obtain a score via the *DEPARTMENT OF ENERGY'S HOME ENERGY SCORE (DOE HES)*. Both of these *ASSET RATING* systems use a modeling tool that will determine energy use projections in *MMBTU's* per year. Research is needed to determine how well these projections line up to one another for the same house. For example, if we look at the same home using the two approaches, will they deliver a similar enough projection in energy use? Understanding how these line up with one another, and the potential margin of error is critical to a score that includes both.

5.3.4 Set up Database System for recording and tracking data

There are three key types of data that need to be tracked and maintained for a program to be successful:

1. Available Workforce: A database of local certified raters and Contractors that have an understanding of the program and are able to assess a home for the Score and perform retrofit work. The need for additional local qualified contractors to perform the work in a reasonable time period;
2. Participating Home Data: Data on houses participating, including the Scores, address, date of rating, and other relevant information;
3. Evaluation Data: Quality assurance and consumer and participant feedback data, including when and why the rating was performed.

5.3.5 Data Infrastructure Requirements

DATA INFRASTRUCTURE refers to the digital structure supporting data storage, sharing, and management. Data infrastructure may include a web portal and a database. In the design of a process and data infrastructure for program and data management, it is essential to develop a description of the requirements and data points needed to meet the overall goal. The following list of requirements for the infrastructure reflects the Residential Energy Score Project Team's research on current programs, best practices, and local needs.

1. Store and Access data on Participating Raters

There will be multiple participating raters, both HERS and HES certified, that will likely represent a range of public and private organizations. The qualifications for these raters are maintained by RESNET or DOE, and raters need to verify these qualifications annually. The program should maintain a list of local participating raters both for certification validation and for the public (homeowner, Realtor, buyer) to locate a local rater via a web portal.

2. Store and Access data on Rating Partners

Each rating system (HERS and HES) requires a rater to belong to a rating provider for quality assurance oversight. These providers can often coordinate to share information and strengthen a program's effectiveness. Multiple organizations would be supporting the delivery of ratings, both as a part of private enterprise as well as in the delivery of energy efficiency programs, such as Assisted Home Performance with ENERGY STAR, Low Income Weatherization, and ENERGY STAR labeled Homes. Information on the providers who have raters participating in the program should also be accessible.

3. Generate a Label

The infrastructure needs to support information from both the HES and HERS rating data and populate the common *LABEL*. It needs to take in data from approved sources (such as the software tools approved by these rating systems) in order to produce this *LABEL*. A mechanism for generating a local, graphically rich *LABEL* is necessary, incorporating all of the items highlighted in section 4.3.1 of this paper. The *SCORE* should be stored for retrieval along with the data used to generate the *LABEL* for each home. The system must allow for limits on who can access information about an individual home.

4. Automated Quality Assurance

Before the *LABEL* is produced, the data need to be reviewed to check for obvious errors. Paperless automation the checks data for basic accuracy is crucial to speed up Quality Assurance (QA) and to reduce costs. Timing is important for QA. This review needs to happen before the data are made available to interested sellers or fed into the MLS, or in any way made publicly available. National experience has shown that data errors are more likely to be introduced when energy scores are input directly into the MLS by Realtors or other professionals. Rating data review by RESNET and DOE will be much delayed and not support timely review of rating scores before submission. When a rating is being

used immediately to influence the sale of a home, quality assurance should be fast and highly automated.

Performance Systems Development has created an automated review tool for RESNET energy ratings used by energy raters in 13 states and by utility-funded new home programs. The same database application, Compass, has been extended with funding from DOE to support the *DOE HOME ENERGY SCORE* tool. This may be the only database application in the country with support for both *RESNET HERS INDEX* ratings and *DOE HOME ENERGY SCORE* ratings.

5. Field Quality Assurance

A certain percentage of jobs are given field QA under the terms of both the DOE HES and the RESNET HERS rating. This quality assurance involves a third party performing the rating again to verify results and reviewing electronic and paper documentation to ensure the rater is abiding by the rating standards and performing diagnostic testing appropriately. These QA data are reported to both RESNET and the DOE for tracking and maintaining a rater's certification. Leveraging these national field inspection requirements is important for maintaining a low cost of delivery. This can be achieved by verifying and tracking that a rating has been submitted to these entities. This saves the program from needing to perform a separate field QA.

6. Storage and Retrieval of Ratings

The home rating would ideally happen simultaneously with different types of events, such as home performance audit, home inspection, or post sale, when data can be collected more cost effectively by trained individuals. Because these events are not necessarily aligned with the time a home is listed for sale, the rating information needs to be stored somewhere, and made available for input into the MLS at the appropriate time.

While it is ideal for the public to have access to the *TOMPKINS RESIDENTIAL ENERGY SCORE* data outside of the MLS, some information associated with the rating may need to remain private. The control over which data may be shared is a key requirement of the program, and the infrastructure needs to provide access restrictions so that different stakeholders can access different subsets of data. For example, realtors may benefit from having access to information about Scores by category of regions of the county and at various price points.

Having information from the ratings combined with other information, such as participation in weatherization or local renewable energy programs, age of home, and whether or not retrofit work has been performed, is essential to program evaluation and optimization. It is also tied to the ultimate goal of better understanding the opportunities available to improve energy performance of the housing in Tompkins County. The program needs flexibility in the portal or chosen *INFRASTRUCTURE* to capture this additional information.

7. Training

To make ratings broadly available in the market, training will need to be made available on a recurring basis, and raters will need to be recruited. Training on the specific program, including the local submission and labeling process, would also be necessary.

5.3.6 Creating MLS Data Connection

There are two key database applications that need to be connected - a data repository for the information described above and the Realtor Multiple Listing Service (MLS). Many similar databases, such as the MLS and Department of Assessment databases, are not linked. Currently in Tompkins County, the Department of Assessment manually inputs information that they find on the MLS and vice versa. It is a goal of the program that the Score for homes could be included in online real estate and rental marketplace databases such as Zillow, Trulia, and Realtor.com. Opportunities for this are better now than ever. The Real Estate Standards Organization (RESO) recently added a “Green Verification Metric” field to their Data Dictionary which references both the DOE HES and the RESNET HERS systems. This dictionary creates common standards that lists and describes how all real estate data fields can be included in an MLS and encourages consistent terms and data structures. This new Green Verification Metric is defined in the dictionary as:

“A final score indicating the performance of energy efficiency design and measures in the home as tested by a third-party rater. Points achieved to earn a certification in the High Performance Rating field do not apply to this field. HERS Index is most common with new homes and runs with a lower number being more efficient. A net-zero home uses zero energy and has a HERS score of 0. A home that produces more energy than it uses has a negative score. Home Energy Score is a tool more common for existing homes and runs with a higher number being more efficient. It takes square footage into account and caps with 10 as the highest number of points.” (Real Estate Standards Organization, 2016)

This provides the structure for including the Score in the local MLS in Tompkins County. There are systems available and in development that would aid in connecting the rating data or Score into the MLS. The U.S. DOE announced on September 15, 2015 an award providing three years of funding to Northeast Energy Efficiency Partnerships (NEEP) to support the development of **HELIX, or the Home Energy Labeling Information Exchange** in an effort to “expedite the creation of large-scale home energy labeling policies and programs that support the market valuation of energy efficiency in homes by making U.S. DOE HOME ENERGY SCORE (HES) data accessible to local Multiple Listing Services (MLS) and other market interests”. (Northeast Energy Efficiency Partnerships, 2015)



Figure 6: The Home Energy Labeling Information Exchange (HELIX) can facilitate the delivery of the score from the program database to the multiple listing service

Another tool available that supports home energy rating and disclosure programs is the DOE's **Standard Energy Efficiency Database Platform, or SEED**. SEED is an open source database application for managing information related to energy scores on buildings. SEED was created to support the management of benchmarking mandates for large cities but is now being adapted for use with residential ratings. NEEP is currently exploring ways for HELIX to leverage SEED to facilitate this process. NEEP released a one-page information sheet on HELIX, found in Attachment 8 to this document, that states that HELIX will support incorporating home rating information into the MLSs "while providing appropriate data security and privacy protections." (Northeast Energy Efficiency Partnerships, 2015)

One key capability of SEED is to manage energy data for large numbers of buildings. SEED can collect information from property assessment and other existing databases and match this information up with energy ratings submitted by qualified raters (Figure 7).

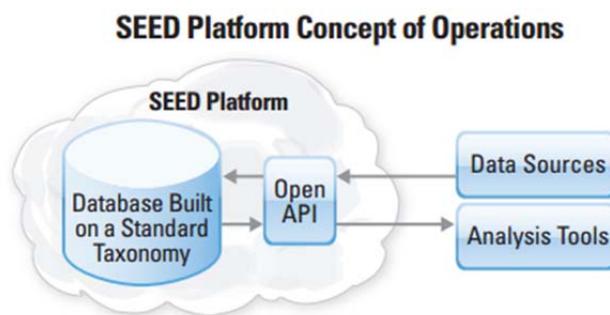


Figure 7: SEED Platform Concept of Operations

The SEED database itself is not intended for use by energy raters, Realtors or homeowners, but rather supports data management for governments and programs. SEED can be connected to user friendly web portals that can allow raters, homeowners or program staff to input or access information. These basic web portals can be easily created and would have very low maintenance costs. Some cities are investing in enhanced web portals that contain data mapping and data visualization tools. An example of this can be seen in Philadelphia's commercial benchmarking portal, a website that allows individuals to easily create visual reports on emissions, building size, building type, and score for the city.

In addition to collecting the data on a home from the rater, the program must also generate the LABEL. SEED has an option to install a plug-in application as an extension. A plug-in created to generate the local LABEL could be an option for this program design. A one-page information sheet on SEED can be found in attachment 9. It's important to note that this database includes controlling the disclosure of information as determined by the individual program set up but can allow data sharing with other third parties at the client or homeowners' discretion. As part of implementation and infrastructure development, the team should consider feedback received during outreach on homeowner privacy rights and concerns.

Another related tool is Compass, developed by Performance Systems Development. This tool could be used to provide the portal for energy raters to submit ratings to the program, to automate quality assurance checks on the rating information, and to generate the local LABEL. This information could be

used in combination with SEED for storage. PSD also has direct experience with the visual connectivity functionality of SEED through its role as the developer of the interconnection between SEED and EPA Portfolio Manager benchmarking system under a contract with Lawrence Berkeley National Lab (LBNL) and US DOE.

5.3.7 Infrastructure Deployment

The initial deployment of the information technology (IT) system would require the development of a detailed plan for IT implementation that is beyond the scope of this report. Once the IT system is planned, the deployment can happen in stages. Deployment would start with a database, web portal, and the creation of the data connection to the MLS.

The next stage of IT deployment would be the development of the portals for credentialed users to access data or supply data to the system. These web sites can also provide homeowners with access to a list of qualified raters and link to other energy efficiency resources in the county.

The final stage of IT deployment would be the development of a public-facing portal with data visualization and reporting tools to help increase understanding about an individual homes score, and energy use in Tompkins County housing as a whole. The portal could include reports that are designed for various audiences, such as Homebuyers or Renters, Realtors, or the Tompkins County Department of Assessment. The exact information that is displayed will consider homeowner privacy concerns and should first be proposed for public feedback.

If adequate funding is available for program start up, investing some of these funds in automation for the LABEL generation and QA can help reduce the cost of ongoing support for the rating effort. While automation of the process is an important end goal, low initial rating volumes may require offering the label with more manual generation process, such as a spreadsheet application. This application could be used by the qualified energy efficiency consulting staff. Similarly, manual QA review can be used at the initial launch.

Ongoing support for the ratings requires an efficient and responsive review process. There is considerable time pressure in the process of listing a home. Being able to demonstrate that the staffing and systems are in place to make the process of obtaining a rating, getting a QA review, and posting it to the MLS quickly and efficiently will go a long way to addressing the concerns of the real estate community and the public.

5.3.8 Staffing

The program would require both IT support and energy efficiency consulting support as well as general administrative roles. Determining detailed staffing needs would be dependent on the implementer and final program plan and IT design.

5.4. Phase Four: Pilot

Starting participation with a pilot phase would allow for testing the design and effectiveness of the *PROGRAM* on a smaller scale. One option for a pilot is to target 25% of all single-family homes in Tompkins County that are built, sold or significantly retrofitted in approximately one year, until 250 homes are rated, scored, and labeled:

- Location – throughout Tompkins County;
- Duration – approximately one year;
- Target 250 single-family homes and apartments for labeling – HERS rating for all new house construction and units within multifamily buildings 4 stories or less in height; HES rating for all major retrofits and 10-25% of existing homes sold (ratings performed in advance so that the label is available at time of house listing);
- Staff – 2-3 full-time raters certified for HES and HERS;
- Program implementer to design label, collect data, drive participation through education and outreach, and evaluate the program as described below;
- Education and outreach – work with municipal building departments to target all new construction and all major retrofits; work with realtors to educate prospective sellers to have rating performed before listing house; work with all residents to voluntarily get rating/label and to understand what the label means; and
- Cost – ROUGH BALLPARK \$300,000 is needed to cover the staff time so that ratings are FREE to those participating in pilot.

During the pilot phase, the following aspects of the program should be evaluated and fine-tuned:

1. Effectiveness and relevancy of the *LABEL*;
2. Training needs of local workforce on HES and HERS Certification;
3. *LABEL* generation process;
4. Retrieval and storage of data;
5. Quality Assurance;
6. Potential negative impacts on low income population;
7. Best time/most frequent time that a rating occurs;
8. The ability of the *TOMPKINS RESIDENTIAL ENERGY SCORE PROGRAM* to influence home improvements, home purchase decisions, and purchase price; and
9. Available funding for home energy retrofit work.

Program evaluation and reporting should include feedback and discussions with the Technical Advisory Committee, the Residential Energy Score Project Team, and participating municipalities.

In addition to accepting new homes into the program, the pilot phase should encourage labeling homes that have had ratings in the past and adding these data to the program database. This will need an added layer of quality assurance to ensure the data are accurate and still relevant.

5.5. Phase Five: Voluntary Launch

The team has determined that a voluntary program is the best approach for several reasons. The legal review that was performed as part of this project (Attachment 1) revealed that at this time there are potential legal limitations in New York State for municipalities to create an ordinance or law requiring home energy scoring. Realtors expressed concern that a mandate at time of sale could add extra stress and burden on sellers at an already stressful time.

Launching the program on a voluntary basis will provide the opportunity to evaluate whether the free market can scale the program appropriately and capture the public's enthusiasm for home rating and scoring. A voluntary program could build toward a mandate in the future, if desirable and legally permissible, and could use the staged implementation approach described later in this document. A voluntary program should include an increased priority on providing education on the value of asset ratings.

An initial voluntary phase, where participation is optional, is useful to figure out best practices and allow the *DATA INFRASTRUCTURE* to be tested and fine-tuned. Research, however, shows that voluntary rating program participants are disproportionately owners of high-performing homes, and they participate out of an interest in certifying or recognizing their homes, rather than to drive retrofit. (Dunsky Energy Consulting and Northeast Energy Efficiency Partnerships, 2009) This is one reason that a mandatory program may be a preferred long-term goal. Without getting large-scale adoption, the program will not reach its goal.

The voluntary program should capture all ratings that have already been completed or are already in process in the area, independent of the program. Some homes in Tompkins County are already voluntarily receiving HERS Index and HES *ASSET RATINGS* due to their owner's desire to obtain certification as ENERGY STAR, Passive House, LEED for Homes, and participation in NYSERDA's Low-rise New Construction Program. 173 homes in Tompkins County received a HERS Index between 2011 and 2015. As of May 2016, no HES ratings have been performed in Tompkins County. While 173 homes is a small number in light of the 20,000 one (1) and two (2) family residential properties in Tompkins County, it shows that there is already a starting base of homes in the area that have asset ratings and will continue to acquire asset ratings independent of the program. The program needs to include the existing ratings in the Tompkins Residential Energy Score database, while also educating consumers and others about the value, and driving demand for ratings to happen going forward. In order to get additional participation, homeowners need to see a clear value, or incentive, to participate. Below, steps are listed for launching the program.

5.5.1 Start Accepting Ratings

Once the IT systems are in place with the ability to track and generate the Tompkins Residential Energy Score and label, the program can begin accepting participants. Ratings could be submitted by either HERS or HES raters and tracked in the chosen infrastructure.

5.5.2 Begin Marketing and Education Plan Including Label

This phase would require the development of marketing and educational materials to support the program that targets Realtors, homeowners, homebuyers, raters, home performance contractors, code officers, and home inspectors. This should include the value of the rating and the value of energy efficiency, logistics for how to participate in the program, and how to use the information on the label. The Department of Energy (DOE), the Residential Energy Services Network (RESNET), and the Northeast Energy Efficiency Partnerships (NEEP) offer great educational resources and templates. The program should utilize local organizations, such as Cornell Cooperative Extension and Solar Tompkins to strengthen efforts. The RESP team, through its outreach efforts, identified the top four (4) messaging motivators:

1. Saving money;
2. Knowing what to expect in monthly energy costs;
3. Saving energy; and
4. Reducing greenhouse gas emissions.

5.5.3 Evaluation and Adjustments – Policy Optimization

Analyze data to help determine rates of adoption, trends in the types of homes participating, and major hurdles and opportunities to increase participation. This should include customer feedback as well as data analysis. Key ideas for policy optimization should include most frequent time of rating, if ratings are tied to home performance work, and where there are obvious gaps in participation among the population (e.g. income level, region, housing type). This information helps guide the program going forward, and helps validate funding needs and program effectiveness, cost sharing, and integration with other programs. Evaluation should specifically look at participation and the ability to support low-income households and households that statistically are more likely to have a higher energy burden such as African-American, Latino, and Renters. (Drehobl & Ross, 2016) If only certain types of homes or individuals are participating, the data on “average Tompkins county home score” could be skewed. The program should target outreach to as diverse a group as possible and evaluate trends in participation.

Regular evaluations should revisit the idea of a mandate, specifically whether and when a mandate is an appropriate option. Ultimately the value of the program and its effectiveness at creating value in energy efficiency in real estate transactions and driving energy improvements is dependent on wide-scale participation. If the market drives sufficient participation, a mandate is not necessary.

5.6. Phase Six: Revise Program based on Evaluation

After evaluation is complete, review results and consider how to best strengthen the program. This could include increased marketing, additional workforce training, creating incentives to enhance participation rate, and re-visiting the legality and advisability of creating mandates for participation.

6. Conclusion

A residential energy score *program* for the participating municipalities and across the County should allow for the largest participation possible by incorporating both the *RESNET HERS INDEX* for new homes and the *DOE HOME ENERGY SCORE* for the existing housing stock. Displaying the *TOMPKINS RESIDENTIAL ENERGY SCORE* in units of estimated *SITE ENERGY* use in *MMBTU/YEAR* would allow the program to incorporate both systems. With this approach, homeowners can compare all rated homes to each other and account for renewable and on-site energy production on the label.

It is important to remember that without large adoption, the program will struggle to meet the ultimate goals of valuing energy efficiency in real estate transactions and reducing greenhouse gas emissions. For example, if only some refrigerators received EnergyGuide information, or only some cars had miles per gallon ratings, the information would begin to lose relevance. If we cannot compare the score of one home to another, or see where it ranks in the range of homes in Tompkins County, it becomes much less valuable. In order to achieve this wide-spread adoption, the Residential Energy Score Project team is proposing a staged approach to allow for public education, market readiness, and further program development, such as developing the *LABEL*, marketing materials, and necessary *DATA INFRASTRUCTURE*. A central implementer overseeing this process and creating connections with local programs and existing workforce is essential for success. A pilot and voluntary program with regular evaluation, assessment, and discussion about future options ensures program optimization. The proposed Tompkins Residential Energy Score Program will assist Tompkins County municipalities in moving toward a more sustainable, energy independent, and healthier future for all residents by increasing consumer awareness, understanding, and ability to value the energy use and efficiency in homes.

7. Glossary

Asset Rating - Asset ratings create a score by evaluating a home's actual *physical structure* and *mechanical systems*, and major lights and appliances. The asset rating is scored by the national calculation methodology (NCM). Using an approved calculation tool, an assessor creates a model of the annual CO2 emissions from the building.

Data Infrastructure - Data infrastructure refers to the digital structure supporting data sharing and management. Data infrastructure may include a web portal and a database.

DOE Home Energy Score – The Department of Energy Home Energy Score is similar to a vehicle's miles-per-gallon rating. The Score allows homeowners and homebuyers to identify how much energy a home is expected to use and provides suggestions for improving its energy efficiency. It also allows homeowners to compare the energy performance of their homes to other homes nationwide.

Home Energy Rating – also referred to as a “rating” in the document, a Home Energy Rating refers to the process of evaluating a home's energy efficiency and performance in a standard way that can be compared to other homes by focusing on the energy efficiency features of the home itself. The two most common type of home energy ratings used today are *OPERATIONAL RATINGS* and *ASSET RATINGS*.

Label - The label acts as a standard method to graphically communicate home rating information for both existing and new home construction. The label is generated from approved data sources (such as the two rating software tools) and is stored for retrieval along with the data used to generate the label for each home.

MMBtu's - 1 MMBtu is equal to 1 million BTU (British thermal unit). All fuel energy use can be converted to this unit. One BTU is approximately equal to the energy released by burning one kitchen match.

Operational Rating - Also known as "Measured Energy Rating", an Operational Rating is based on measured amounts of delivered and exported energy. The measured rating is the weighted sum of all energy carriers used by a building and is a measure of the in-use performance of a building. This measurement is relevant to the certification of actual energy performance.

Program - A residential energy disclosure program evaluates the relative energy efficiency and energy use of homes, and evaluates opportunities for improvement, and standardizes the availability of this information in a given market.

Program Implementer - The Program Implementer is responsible for developing and implementing the program. Responsibilities include: overseeing and guiding program design, training and policy support, education and outreach, program optimization, program quality assurance and enforcement, results/data tracking, facilitating connections with local workforce and home performance programs, and general program administration.

RESNET HERS Index - The Home Energy Rating System (HERS) Index is the industry standard by which a home's energy efficiency is measured. It's also a nationally recognized system for inspecting and calculating a home's energy performance.

Site Energy - Site energy is the amount of heat and electricity energy consumed by a building as reflected in the utility bills. Analyzing site energy can illustrate how the energy use for an individual building has changed over time. It does not include any inefficiencies or losses that happen transmitting energy to the house from its original source.

Source Energy - Source energy represents the total amount of raw fuel that is needed to operate a building. By taking *all* energy use into account, the score provides a complete assessment of energy efficiency in a building. It includes all transmission, delivery, and production losses.

Tompkins Residential Energy Score or "The Score" - The Score allows homes in Tompkins County, New York to view the estimated annual energy use of homes in one comparable metric based on an asset rating-

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9. List of Attachments

1. Memo: Legal Issues for Home Energy Rating and Disclosure Program
2. Report on Existing Home Energy Rating and Disclosure Laws and Programs and Best Practices
3. Review and Analysis of Preliminary Data in Tompkins County
4. Home Energy Scoring Tool Data Collection Sheet
5. RESNET HERS Index Rated Features
6. HomeStyle Energy Mortgage FAQ
7. HomeStyle Energy Mortgage Announcement
8. HELIX – Information Sheet
9. SEED – Information Sheet
10. County Assessment Department Data from ImageMate
- ~~10-11.~~ Related Programs and Financing Mechanisms in New York and Tompkins County