Home energy rating systems

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Home Energy Rating Systems (HERS)
A Home Energy Rating is a measurement of a home’s energy efficiency, used primarily in the United States. HERS Ratings make use of a relative energy-use index called the HERS Index – a HERS Index of 100 represents the energy use of the “American Standard Building” and an Index of zero indicates that the proposed building uses no net purchased energy (a Zero Energy Building). Other countries also have similar schemes - in Australia it is known as the House Energy Rating and is based upon a 5 star rating and in the UK the Energy Performance Certificates have a rating from A to G.

HERS provide a standardized evaluation of a home's energy efficiency and expected energy costs. The evaluation is conducted in accordance with uniform standards and includes a detailed home energy use assessment, conducted by a state-certified assessor, using a suite of nationally-accredited procedures and software tools. The rating can be used to judge the current energy efficiency of a home or to estimate the efficiency of a home that is being built or refurbished. A rating prior to construction or improvement is called a “projected rating” and a rating that is used to determine a home’s current efficiency is referred to as a “confirmed rating.” The varying climatic conditions in different parts of the country are taken into account and are benchmarked according to average household energy consumption particular to a particular climatic region.

A home energy rating can also qualify a home owner or buyer for an energy efficient mortgage (EEM), or an energy improvement mortgage (EIM). It can also be used by for both existing, and new homes. A home energy rating of an existing home allows a homeowner to receive a report listing potential options for upgrading its energy efficiency. The owner can then use the report to determine the most efficient ways in which to improve the home’s energy efficiency. A home energy rating of a new home allows buyers to compare the energy efficiencies of different homes that they are considering to buy.

The rating and assessment
A confirmed rating requires an inspection of the home from an energy rater or assessor. The rater assesses the home to identify its energy characteristics, such as insulation levels, window efficiency, wall-to-window ratios, the heating and cooling system efficiency, the solar orientation of the home, and the water heating system. Performance testing, such as a blower door test for air leakage and duct leakage, is often also part of the rating. The data collected is entered into a RESNET software and translated into a rating score between 1 and 100, depending on its relative efficiency (Figure 1). The home’s energy rating is then equated to a Star rating - one star for a very inefficient home to five stars for a highly efficient home. The U.S. Department of Energy recommended Home Energy Ratings report will typically contain:

- Overall Rating Score of the house
- Recommended cost-effective energy modifications
- Estimates of the cost, annual savings, and useful projected life of the modifications
- The potential Improved Rating Score after the installation of recommended modifications
- The estimated projected annual energy costs for the existing home, before and after the modifications

Cost-effective upgrades are those which will save more money through energy savings over their projected life span than they cost to install.
History
Home energy ratings can be dated back to 1981, when a group of mortgage industry leaders established the National Shelter Industry Energy Advisory Council, whose goal was to establish a measurement system which factored the energy efficient features of a home into the mortgage loan. This resulted in the formation of the Energy Rated Homes of America, a national non-profit organization, which has grown steadily and now has member rating programs operating in the majority of US states. In response to the 1992 Energy Policy Act, the US Department of Energy (DOE) collaborated with the newly established HERS Council to develop a common Home Energy Rating System.

Energy mortgages
The home energy rating is a recognized tool within the US mortgage industry. An energy mortgage is a mortgage that credits a home’s energy efficiency in the home loan. For an energy efficient home, for example, it could mean giving the home buyer the ability to buy a higher quality home because of the lower monthly costs of heating and cooling the home. For homes in which the energy efficiency can be improved, this concept allows the money saved in monthly utility bills to finance energy improvements. Two main types of energy mortgages exist:

- The Energy Improvement Mortgage, which finances the energy upgrades of an existing home in the mortgage loan using monthly energy savings; and
- The Energy Efficient Mortgage, which uses the energy savings from a new energy efficient home to increase the home buying power of consumers and capitalizes the energy savings in the appraisal

The UK Energy Performance Certificates Scheme
Energy Performance Certificates (EPCs) are part of Home Information Packs (HIPs), which have been in effect since the 1st August 2007 in England and Wales for domestic properties with four or more bedrooms. The scheme was extended to include three bedroom homes from the 10th September 2007. Rental properties, which have a certificate valid for 10 years, have been required on new tenancies after the 1st October 2008. Since October 2008 Display Energy Certificates (DECs) are also required for larger public buildings, thus enabling everyone to see how energy efficient the countries public buildings are. The DEC has to be displayed at all times in a prominent place clearly visible to the public - and they are accompanied by an Advisory Report that lists cost effective measures to improve the energy rating of the building.

The introduction of both HIPS and EPCs has been controversial however, and has been opposed by many in the UK housing industry, such as the Royal Institute of Chartered Surveyors. In practice, there are also many problems with the credibility of the system, as well as with the accuracy of the energy audit itself. The energy survey is performed by a Domestic Energy Assessors (DEA) who visits the property and then inputs the observed information into a software programme which then calculates the energy efficiency of the building. The programme provides a single number for the rating of energy efficiency, and a recommended value of the potential for improvement. There are similar figures for environmental impact. A table of estimated energy bills per annum (and the potential for improvement) is also presented, but without any reference to the actual owners bills. The inspection is often shallow and based upon personal opinion, but the certificates themselves do not allow any margin of error. Energy
Performance Certificates present the energy efficiency of dwellings on a scale of A-G (Figure 2). The most efficient homes - which should have the lowest fuel bills - are in band A. The certificate uses the same scale to define the impact a home has on the environment. Better-rated homes should have less impact through carbon dioxide (CO2) emissions. The average property in the UK is in bands D-E for both ratings. The certificate also includes recommendations on ways to improve the home’s energy efficiency.

See Also:
Energy Audit, Green Energy Certification Schemes, Insulation, Energy Conservation, Energy Payback

Bibliography
National Home Energy Rating, www.nher.co.uk/
Residential Energy Services Network's (RESNET), www.resnet.us
www.communities.gov.uk/epbd

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