

## *Energy & Housing Glossary*

### **Accreditation**

The process of certifying a Home Energy Rating System (HERS) as being compliant with the national industry standard operating procedures for Home Energy Rating System.

### **AFUE Annual Fuel Utilization Efficiency (AFUE)**

Measures the amount of fuel converted to space heat in proportion to the amount of fuel entering the furnace. This is commonly expressed as a percentage. A furnace with an AFUE of 90 could be said to be 90% efficient. AFUE includes any input energy required by the pilot light but does not include any electrical energy for fans or pumps.

### **Air Flow Retarder**

Sealants used to keep outside air and inside air out of the building envelope. Four common approaches to retarding air flow include careful sealing using the following building components: drywall and framing, plastic sheets (should not to be used in hot and humid climates) between drywall and framing, exterior sheathing, and building paper. Air flow retarders define the pressure boundary in a house that separates indoor and outdoor air.

### **Building Envelope**

The outer shell, or the elements of a building, such as walls, floors, and ceilings, that enclose conditioned space. See also *Pressure Boundary* and *Thermal Boundary*.

### **Btu (British Thermal Unit)**

A standard unit for measuring energy. One Btu is the amount of energy required to raise the temperature of one pound of water by one degree Fahrenheit from 59 to 60. An Inches-Pounds unit.

### **CABO (Council of American Building Officials)**

A national organization of building code officials and interested parties, which, through a national consensus process, developed, adopted and promulgated the national Model Energy Code (MEC). CABO has recently become CABO International and has taken on the administrative responsibility for the development of a uniform international building code through an International Code Council (ICC).

### **Capacity**

The rate at which a piece of equipment works. Cooling capacity is the amount of heat a cooling system can remove from the air. For air conditioners total capacity is the sum of latent capacity, the ability to remove moisture from the air, and the sensible capacity, the ability to reduce dry-bulb temperature. Heating system capacity indicates how much heat a system can provide. Heating and cooling capacities are rated in Btu per hour.

### **Chase**

An enclosure designed to hold ducts, plumbing, electric, telephone, cable, or other linear components. A chase designed for ducts should be in conditioned space and include air flow retarders and thermal barriers between it and unconditioned spaces such as attics.

### **Construction Documents**

The drawings (plans) and written specifications that describe construction requirements for a building.

### **COP (Coefficient of Performance)**

A measure of efficiency typically applied to heat pumps. The COP for heat pumps is the ratio, at a given point in time, of net heat output to total energy input expressed in consistent units and under designated conditions. Heat pumps result in a COP greater than 1 because the system delivers or removes more heat energy than it consumes. Other specific definitions of COP exist for refrigeration equipment. See HSPF for a description of a unit for seasonal efficiency.

## APPENDIX II: ENERGY & HOUSING GLOSSARY

### **Debt-to-Income Ratio**

The ratio, expressed as a percentage, which results when a borrower's total monthly payment obligations on long-term debt are divided by their gross monthly income. This is one of two ratios (housing expense-to-income ratio being the other) used by the mortgage industry to determine if a prospective borrower qualifies (meets the underwriting guidelines) for a specific home mortgage. Fannie Mae, Freddie Mac and FHA underwriting guidelines set an upper limit of 36% on this value for conventional loans but increase ("stretch") the ratio by 2% for qualifying energy efficient houses.

### **Dry-Bulb Temperature**

The temperature of air indicated on an ordinary thermometer, it does not account for the affects of humidity.

### **ECM (Energy Conservation Measure)**

An individual building component or product that directly impacts energy use in a building.

### **EEM (Energy Efficient Mortgage)**

Specifically, a home mortgage for which the borrower's qualifying debt-to-income and housing expense-to-income ratios have been increased ("stretched") by 2% because the home meets or exceeds CABO's 1992 version of the Model Energy Code (MEC). This so-called "stretch" mortgage is nationally underwritten by Fannie Mae, Freddie Mac and the Federal Housing Administration (FHA). This term is often used generically to refer to any home mortgage for which the underwriting guidelines have been relaxed specifically for energy efficiency features, or for which any form of financing incentive is given for energy efficiency.

### **EER (Energy Efficiency Ratio)**

A measurement of the instantaneous energy efficiency of cooling equipment, normally used only for electric air conditioning. EER is the ratio of net cooling capacity in Btu per hour to the total rate of electric input in watts, under designated conditions. The resulting EER value has units of Btu per watt-hour.

### **EF (Energy Factor)**

A standardized measurement of the annual energy efficiency of water heating systems. It is the annual hot water energy delivered to a standard hot water load divided by the total annual purchased hot water energy input in consistent units. The resultant EF value is a percentage. EF is determined by a standardized U.S. Department of Energy (DOE) procedure.

### **Energy (Use)**

The quantity of onsite electricity, gas or other fuel required by the building equipment to satisfy the building heating, cooling, hot water, or other loads or any other service requirements (lighting, refrigeration, cooking, etc.)

### **Energy Audit**

A site inventory and descriptive record of features impacting the energy use in a building. This includes, but is not limited to all building component descriptions (locations, areas, orientations, construction attributes and energy transfer characteristics); all energy using equipment and appliance descriptions (use, make, model, capacity, efficiency and fuel type) and all energy features.

### **ENERGY STAR® Home**

A home, certified by the U.S. Environmental Protection Agency (EPA), that is at least 30% more energy efficient than the minimum national standard for home energy efficiency as specified by the 1992 MEC, or as defined for specific states or regions. ENERGY STAR is a registered trademark of the EPA.

### **Envelope**

*See Building Envelope*

### **Fannie Mae**

#### **(FNMA - Federal National Mortgage Association)**

A private, tax-paying corporation chartered by the U.S. Congress to provide financial products and services that increase the availability of housing for low-, moderate-, and middle-income Americans.

### **FHA (Federal Housing Administration)**

A division of the U.S. Department of Housing and Urban Development (HUD). FHA's main activity is the insurance of residential mortgage loans made by private lenders.

## APPENDIX II: ENERGY & HOUSING GLOSSARY

### **Freddie Mac**

#### **(FHLMC - Federal Home Loan Mortgage Corporation)**

A stockholder-owned organization, chartered by the U.S. Congress to increase the supply of mortgage funds. Freddie Mac purchases conventional mortgages from insured depository institutions and HUD-approved mortgage bankers.

### **Grade Beam**

A foundation wall that is poured at or just below the grade of the earth, most often associated with the deepened perimeter concrete section in slab-on-grade foundations.

### **HERS (Home Energy Rating System)**

A standardized system for rating the energy-efficiency of residential buildings.

### **HERS Energy-Efficient Reference Home (EERH)**

The EERH is a geometric “twin” to a home being evaluated for a HERS rating and according to a newly-revised system, is configured to be minimally compliant with the 2004 International Energy Conservation Code.

### **HERS Provider**

An individual or organization responsible for the operation and management of a Home Energy Rating System (HERS).

### **HERS Rater**

An individual certified to perform residential building energy efficiency ratings in the class for which the rater is certified.

### **HERS Score**

A value between 0 and 100 indicating the relative energy efficiency of a given home as compared with the HERS Energy-Efficient Reference Home as specified by the HERS Council Guidelines. The greater the score, the more efficient the home. A home with zero energy use for the rated energy uses (heating, cooling and hot water only) scores 100 and the HERS Reference Home scores 80. Every one point increase in the HERS score amounts to a 5% increase in energy efficiency.

### **Housing Expense-to-Income Ratio**

The ratio, expressed as a percentage, which results when a borrower’s total monthly housing expenses (P.I.T.I.) are divided by their gross monthly income. This is one of two ratios (debt-to-income ratio being the other) used by the mortgage industry to determine if a prospective borrower qualifies (meets the underwriting guidelines) for a specific home mortgage. Fannie Mae, Freddie Mac and FHA underwriting guidelines set an upper limit of 28% on this value for conventional loans but increase (“stretch”) the ratio by 2% for qualifying Energy Efficient Mortgages (EEM).

### **Housewrap**

Any of several spun-fiber polyolefin rolled sheet goods for wrapping the exterior of the building envelope.

### **HSPF (Heating Season Performance Factor)**

A measurement of the seasonal efficiency of an electric heat pump using a standard heating load and outdoor climate profile over a standard heating season. It represents the total seasonal heating output in Btu divided by the total seasonal electric power input in watt-hours (Wh). Thus, the resultant value for HSPF has units of Btu/Wh.

### **Jump Duct**

A flexible, short, U-shaped duct (typically 10-inch diameter) that connects a room to a common space as a pressure balancing mechanism. Jump ducts serve the same function as transfer grilles.

### **Load**

The quantity of heat that must be added to or removed from the building (or the hot water tank) to satisfy specific levels of service, such as maintaining space temperature or hot water temperature at a specified thermostat setting (see also the definitions of energy and thermostat).

### **Low-E**

Refers to a coating for high-performance windows, the “E” stands for emissivity or re-radiated heat flow. The thin metallic oxide coating increases the U-value of the window by reducing heat flow from a warm(er) air space to a cold(er) glazing surface. Low-E coatings allow short-wavelength solar radiation through windows, but reflect back longer wavelengths of heat.

## APPENDIX II: ENERGY & HOUSING GLOSSARY

### **MEC (Model Energy Code)**

A “model” national standard for residential energy efficiency. The MEC was developed through a national consensus process by the Council of American Building Officials (CABO) and is the accepted national minimum efficiency standard for residential construction. Since MEC is a model code, it does not have the “force of law” until it is adopted by a local code authority. The MEC is used as the national standard for determining Energy Efficient Mortgage (EEM) qualification, and it serves as the national “reference point” used by Home Energy Rating Systems (HERS) in the determination of energy ratings for homes.

### **Mechanical Ventilation**

The active process of supplying or removing air to or from an indoor space by powered equipment such as motor-driven fans and blowers, but not by devices such as wind-driven turbine ventilators and mechanically operated windows.

### **Performance Test**

An on-site measurement of the energy performance of a building energy feature or an energy using device conducted in accordance with pre-defined testing and measurement protocols and analysis and computation methods. Such protocols and methods may be defined by national consensus standards like those of the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) and the American Society for Test and Measurement (ASTM).

### **P.I.T.I.**

An abbreviation which stands for principal, interest, taxes, and insurance. These generally represent a borrower’s total monthly payment obligations on a home loan. The taxes and insurance portion are often paid monthly to an impound or escrow account and may be adjusted annually to reflect changes in the cost of each.

### **Pressure Boundary**

The point in a building at which inside air and outside air are separated. If a building were a balloon, the rubber skin would form the pressure boundary. Where inside and outside air freely mingle there is no pressure boundary.

### **Pressurization Test**

A procedure in which a fan is used to place a house, duct system, or other container, under positive or negative air pressure in order to calculate air leakage.

### **RESNET (Residential Energy Services Network)**

The national association of energy rating providers.

### **Rated Home**

A specific residence that is evaluated by an energy rating.

### **R-Value**

Measures a material’s ability to slow down or resist the transfer of heat energy, also called thermal resistance. The greater the R-value, the better the resistance, the better the insulation. R-values are the reciprocal of U-values. See U-values for more information.

### **Sealed Combustion**

Sealed combustion means that a combustion appliance, such as a furnace, water heater, or fireplace, acquires all air for combustion through a dedicated sealed passage from the outside; combustion occurs in a sealed combustion chamber, and all combustion products are vented to the outside through a separate dedicated sealed vent.

### **SEER (Seasonal Energy Efficiency Ratio)**

A measurement similar to HSPF except that it measures the seasonal cooling efficiency of an electric air conditioner or heat pump using a standard cooling load and outdoor climate profile over a standard cooling season. It represents the total seasonal cooling output in Btu divided by the total seasonal electric input in watt-hours (Wh). The SEER value are units of Btu/Wh.

### **Semi-Permeable**

The term vapor semi-permeable describes a material with a water vapor permeance between 1 and 10 perms. Water vapor can pass through a semi-permeable material but at a slow rate.

### **Shading Coefficient (SC)**

The ratio of the total solar heat admittance through a given glazing product relative to the solar heat admittance of double-strength, clear glass at normal solar incidence (i.e., perpendicular to the glazing surface).

## APPENDIX II: ENERGY & HOUSING GLOSSARY

### **Solar Heat Gain Coefficient (SHGC)**

SHGC measures how well a window blocks heat caused by sunlight. The lower the SHGC rating the less solar heat the window transmits. This rating is expressed as a fraction between 0 and 1. The number is the ratio of a window's solar heat admittance compared to the total solar heat available on the exterior window surface at normal solar incidence (i.e., perpendicular to the glazing surface).

### **Sone**

A sound rating. Fans rated 1.5 sones and below are considered very quiet.

### **Supply ducts**

The ducts in a forced air heating or cooling system that supply heated or cooled air from the or air conditioner to conditioned spaces.

### **Thermal Boundary**

The border between conditioned and unconditioned space where insulation should be placed.

### **Thermostat**

A control device that measures the temperature of the air in a home or the water in a hot water tank and activates heating or cooling equipment to cause the air or water temperature to remain at a pre-specified value, normally called the set point temperature.

### **Ton(s) of Refrigeration**

Units used to characterize the cooling capacity of air conditioning equipment. One ton equals 12,000 Btu/h.

### **U-Value**

Measures the rate at which heat flows or conducts through a building assembly (wall, floor, ceiling, etc.). The smaller the u-value the more energy efficient an assembly and the slower the heat transfer. Window performance labels include U-values (calling them U-factors) to help in comparing across window products.

### **Ventilation**

The controlled movement of air into and out of a house.

### **W (watt)**

One of two (Btu/h is the other) standard units of measure for the rate at which energy is consumed by equipment or the rate at which energy moves from one location to another. It is also the standard unit of measure for electrical power.

### **Wet-Bulb Temperature**

A measure of combined heat and humidity. At the same temperature, air with less relative humidity has a lower wet-bulb temperature. See *Dry-Bulb Temperature*.

### **Wind-Washing**

Air movement due to increased pressure differences that occur at the outside corners and roof eaves of buildings. Wind-washing can have significant impact on thermal and moisture movement and hence thermal and moisture performance of exterior wall assemblies.

### **Xeriscaping**

Landscaping that minimizes outdoor water use while maintaining soil integrity and building aesthetics. Typically includes emphasis on native plantings, mulching, and no or limited drip/subsurface irrigation.

### **Zero Energy House**

Any house that over time, averages out to net zero energy consumption. A zero energy home may supply more energy than it needs during peak demand, typically using one or more solar energy strategies, energy storage and/or net metering.

## APPENDIX II: ENERGY & HOUSING GLOSSARY

### Sources & Additional Information

- American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE). 1991. *Terminology of Heating Ventilation Air Conditioning and Refrigeration*. Atlanta, GA.
- Building News. 2001. *Construction Dictionary*. BNi Publications, Los Angeles, CA.
- Florida Solar Energy Center (FSEC). *Energy-Efficiency Economics Terms and Definitions* available on the Web at [www.fsec.ucf.edu/bldg/fyh/ratings/e\\_terms.htm](http://www.fsec.ucf.edu/bldg/fyh/ratings/e_terms.htm)
- Lstiburek, Joseph. 2002. *Builder's Guide Hot and Humid Climates*. Energy & Environmental Building Association. Minneapolis, MN [www.eeba.org](http://www.eeba.org)
- *Home Energy Magazine*. 1997. "No-Regrets Remodeling: Creating a Comfortable, Healthy Home That Saves Energy." Energy Auditor & Retrofitter, Inc. Berkeley, CA.