

# ASHRAE Building EQ

## *Program Will Help Owners, Operators Assess Buildings and Guide Good Decisions*

By **Ronald E. Jarnagin**, Member ASHRAE

With 40% of U.S. energy use accounted for by buildings, it is not surprising that much of the activity in energy efficiency today is focused in the building sector. With such a large, diffuse market for buildings, it becomes difficult to figure out exactly where to put the emphasis for improving building energy efficiency.

To meet this need, ASHRAE developed the Building Energy Quotient (Building EQ) rating program, which provides a technically sound tool that rates a building's energy performance and helps to characterize specific buildings that are candidates for improvement.

This tool will assist owners and operators searching for ways to understand their buildings' energy use and to select the most attractive targets for improvement.

The Building EQ rating program is a progressive approach that rates both new and existing buildings. The building's performance is shown on a scale that is easy to understand. The program tends to encourage buildings towards high performance and provides some consistency with international rating programs under way.

ASHRAE launched a pilot phase for the program in November 2009, to be conducted through 2010. During the pilot phase, the evaluation approach and rating scale will be tested with representative buildings to help fine-tune the program. Full-scale launch is expected in late 2010.

### Why Do We Need It?

Simply put, a building energy labeling program such as Building EQ is needed to help owners and operators understand the potential for energy efficiency, as well as the current operating performance of their buildings. It is interesting to note that many people understand the efficiencies of their



automobiles in terms of miles per gallon, yet few understand the efficiency of their buildings.

Questions such as "How is my building performing compared to other buildings of a similar type?" or "What potential does my building have to achieve high energy efficiency?" frequently go unanswered. Building EQ is designed to answer these and other questions.

Recently, the U.S. Congress introduced legislation that would develop a model labeling program that can be implemented by states. While such legislation has yet to pass, the implications are clear that a need is perceived in the U.S., similar to needs in other countries. In many cases the labeling programs are intended to be connected to real estate transactions that

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### Q&A

## Why We Need a Labeling Program

By **Ryan M. Colker**

A building energy labeling program makes use of market-based forces (rather than prescriptive mandates) to influence energy-efficiency investment opportunities. Because building energy use is a concern for a variety of reasons (cost, climate concerns, energy independence and sustainability), the Building EQ program provides an easily understood and consistent mechanism to evaluate energy use.

Building owners and operators can see how their building compares to peer buildings. Potential buyers or tenants can gain insight into the value and potential long-term costs. Operations and maintenance staff can inform decisions about maintenance activities and influence building owners to pursue equipment upgrades and demonstrate the ROI for energy-efficiency projects.

Beyond the benefit received by individual building owners and managers, the increased availability of building data—specifically the relationship between the design and operation of buildings—will be a valuable research tool for the building community.

### What types of ratings are given?

New buildings can receive an *As Designed* rating. An *In Operation* rating can follow once the building has one year of actual energy use data.

### About the Author

**Ryan M. Colker** is ASHRAE's manager of government affairs in Washington, and was a member of the ASHRAE Building Energy Labeling Implementation Committee.

## The Building EQ rating system will have two components, an Operational Rating (*In Operation*) and an Asset Rating (*As Designed*).

would help a prospective owner or tenant further evaluate the value of a particular property by understanding its energy use. Beyond the federal level, jurisdictions such as California, New York and the District of Columbia have introduced building labeling requirements.

### How Does Building EQ Work?

The rating system will have two components, an Operational Rating (*In Operation*) and an Asset Rating (*As Designed*). The operational rating characterizes the building's energy use as it is being operated and is based on actual utility bills.

This rating demonstrates how the building fares compared to peers. The asset rating characterizes the potential for the building's energy use based on the characteristics of the components and systems in the building. This rating gives owners a sense of how a building would perform under a predetermined set of parameters, which would allow easy comparison across buildings. It is based on simulation modeling results.

The linkage between the potential for a building (asset) and the actual performance of the building (operation) is important as it provides a metric that demonstrates the divergence between estimated and actual performance of buildings.

One of the big questions in the building industry today is "Why is the estimated energy performance of buildings not realized in operation of the building?" The Building EQ program will help to answer that question as well.

### How Will Building EQ Be Used?

The Building EQ program will provide information in two basic forms, one for public consumption and another for the building owners and operators for addressing energy improvements. The most prominent information will be a label that conveys the rating scale and specific rating for the building. This information is

intended to be displayed to the public and should be easily understandable.

The colorful label displays ratings in grades of color, length of bars, a qualitative expression and a letter grade (see Page 16). The idea is that through use of the label, market forces will help to drive the selection and acquisition of more efficient buildings.

The second form of information is the Energy Certificate, which contains more detailed information on the energy performance of the building. The information is designed to assist building owners and operators target areas for energy improvements. The Energy Certificate might be useful to a prospective owner by pointing out areas that they may wish to address at time of sale or soon thereafter.

### How ASHRAE Is Supporting Building EQ

ASHRAE is developing a personnel certification for Building Energy Modeling Professionals which will have its first exam at the 2010 Winter Conference. This certification is critical for ensuring consistency in the *As Designed* ratings. Criteria also will be identified for personnel qualified to perform the assessment under the *In Operation* rating. Both of these areas represent additional opportunities for members to increase their knowledge and demonstrate their competency in these key areas.

ASHRAE also has other resources in place, including standards on energy efficiency (90.1 and 100), a standard on commissioning and several special publications on energy auditing and performance metric protocols. In addition, technical resources will be provided in the form of user's manuals and educational offerings. Resources also will be provided to jurisdictions looking to implement a energy disclosure program.

You can find more information at [www.buildingeq.com](http://www.buildingeq.com). Make sure you are ready to answer the question, "Do you know your Building Energy Quotient?" ●

### Q&A (continued)

Existing buildings can receive both *As Designed* and *In Operation* ratings.

The *As Designed* rating provides an assessment based on the components specified in the design and will result from a building energy model.

The *In Operation* rating provides information on the actual energy use of a building and is based on both the structure of the building and how it is operated. The *In Operation* rating will be valid for one year and should be renewed to make use of the trends and insight provided by ongoing assessments.

### When will it be operational?

Upon completion of the pilot program in 2010, the operational (*In Operation*) portion of the label will be widely available, including the necessary instruction manuals and guidance.

The asset (*As Designed*) portion will follow later in 2010 with the supporting documents.

Updates will be available on the Building EQ Web site ([www.BuildingEQ.com](http://www.BuildingEQ.com)), which also will house the interface for submissions to receive the label. The final cost for receiving the label will be determined based on the outcomes of the pilot program, but is expected to be minimal to allow building owners to take advantage of the program benefits.

### How is Building EQ different from existing programs?

Like the EPA's ENERGY STAR program, Building EQ focuses solely on energy, but provides additional features, including potential side-by-side comparison of *As Designed* and *In Operation* ratings; peak-demand reduction and demand management opportunities; on-site renewables; indoor environmental quality indicators; and a list of operational features, including commissioning activities,

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# How Building EQ Works

By **Dan Nall P.E.**, Member ASHRAE

The ASHRAE Building Energy Quotient (Building EQ) incorporates two distinct ratings. Each has a specific purpose and calculation methodology. The two ratings share a similar scale, with zero being best, 100 being the median and values above 100 being worse than average.

The scale is a ratio of the source Energy Use Index (EUI) for the subject building, divided by the median source EUI for that type of building in that climate zone.

The Operational Rating (*In Operation*) provides information on the actual energy use of a building and is based on a combination of the structure of the building and how it is operated.

Information learned through subsequent years of operational labels can provide building owners and operations and maintenance staff with valuable insight into how the building performs, opportunities for improvement, and where similar buildings fall in comparison.

It also provides a means for owners of portfolios of several buildings to identify priorities for energy savings investment.

Following are key features of an operational rating:

- Objective is to improve operations;
- Rating is based on measured energy use, adjusted for weather;
- Field verification is a requirement;
- Ratings are sometimes adjusted based on levels of service;

- Good for use in existing building energy efficiency incentive programs; and
- Good for managing building portfolios over time.

Example: U.S. EPA's ENERGY STAR Portfolio Manager.

The Building EQ Asset Rating (*As Designed*) is intended to be a measure of the energy efficiency quality of the as-built fixed physical components of a building. It differs from the current LEED Energy and Atmosphere Credit 1 in that it is intended to allow comparison among similar buildings within a size range and of the same occupancy type within a climate zone.

The Asset Rating is designed to be relevant for real estate transactions. It expresses an integral measure of the building's inherent energy efficiency.

Essentially, the Asset Rating evaluates the building "hardware" by calculating a source EUI based on normalized "software" (the operations, occupancy and usage patterns of the building).

The Asset Rating achieves this normalization through energy modeling of the physical building as it currently exists, using standard occupancy and operational schedules, and standard equipment and occupant densities that have been developed for each occupancy type. The median source EUI would be the same as used for the Operational Rating.

Following are some features of an Asset Rating:

- Rates the building, not the occupancy and operation;
- Focus is on the physical building characteristics—the "bricks and mortar"—plus permanent energy systems;
- Differences in operational behavior are ignored;
- Rating is derived from a model-based estimate of energy use, compared to a stock median or building code baseline for the building type;
- No inherent requirement for field verification; and
- It is a basis for energy efficiency code compliance and beyond-code new construction incentive programs.

Examples: RESNET and CEC Home Energy Rating Systems. ●

## About the Author

**Dan Nall, P.E.**, is a senior vice president at Flack & Kurtz in New York. Nall was a member of the ASHRAE Building Energy Labeling Implementation Committee.

## *It's the Law*

# Energy Labeling in the UK

By **Hywel Davies, Ph.D.**, Member ASHRAE

The ASHRAE Building EQ program would be appropriate should a rating program be required by a local, state or national government. This was the case in the United Kingdom, which enacted a labeling program in 2008 that uses energy labels, known as Energy Performance Certificates (EPCs). This assesses the potential energy efficiency of the building, independently of how it's used. These labels are a requirement of the Energy Performance of Buildings Directive, introduced by

the European Union (EU) to improve the energy efficiency of buildings, cut carbon emissions, reduce energy demands and improve European energy security by reducing dependence on oil and gas from the Middle East and Russia.

EPCs are produced using an approved software package, which generates a numerical Asset Rating, where zero is zero

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carbon, 100 is the median, and a higher value equates to poorer performance. They are accompanied by a recommendations report, which provides guidance on measures to improve the energy performance of the building. The measures are grouped as low- or no-cost measures, and those with longer payback.

In addition to EPCs, Display Energy Certificates (DECs) are required for buildings over 1,000 m<sup>2</sup> (10,800 ft<sup>2</sup>), "occupied by public authorities and by institutions providing public services to a large number of persons and therefore frequently visited by [them]." A DEC is based on an Operational Rating, a measure of the total metered energy used in the building compared to benchmarks. A score of zero is given to a zero carbon building, and 100 is the median. The DEC assesses actual energy use in the building and must be renewed on an annual basis.

It is intended to motivate public sector building operators to improve the energy performance of their buildings.

EPCs and DECs are produced by energy assessors, who must demonstrate competence to produce a certificate and a report, using the approved software. They must either hold an approved qualification or demonstrate that they have "accredited prior experience and learning" equivalent to the requirements of the relevant National Occupational Standards.

CIBSE, ASHRAE's sister association in the UK, accredits energy assessors for commercial and nonresidential buildings in the UK, and has been involved in the production of thousands of certificates over the past 18 months. CIBSE ensures that accredited assessors meet the requirements, files the certificates on the national register of certificates, which is a legal requirement, and performs quality checks on certificates and assessors. ●

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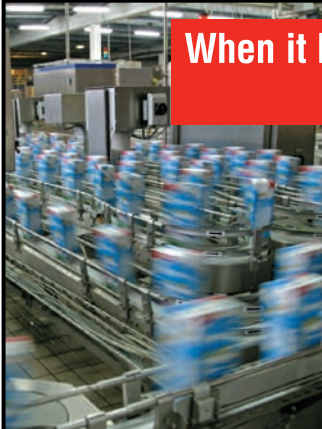
energy-efficiency improvements and information on improving performance.

The Building EQ scale allows differentiation among buildings at the highest levels of performance and encourages the design and operation of net zero energy buildings.

The Building EQ program is not a "green" program, but an information tool to assist building owners in achieving energy-use goals.

Programs like LEED and Green Globes address the numerous considerations that go into the design of green buildings.

With a focus specifically on energy, the Building EQ program will help inform future development of the energy portion of building rating systems and address concerns surrounding the disconnect between a building's design and performance. ●



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