ENERGY REDUCTION MADE EASY

BY MICHAEL LAURIE

As demands upon global energy resources increase, local building owners and managers are turning to energy audits based on sophisticated Building Information Modeling (BIM) to help them make informed decisions that preserve energy and save money.

BIM is the most flexible, effective, and technologically advanced tool currently available for pinpointing potential energy savings available through critical upgrades, alternative designs, and "green" retrofits. The parametric software platform allows the user to identify specific strategies to capture and maximize energy — while it also provides realistic building models that can test and analyze each approach.

The versatility of BIM technology allows an auditor to integrate any combination of changes or strategies and apply them within a single test or analysis. By contrast, conventional energy auditors can only show the result of modifying one component at a time.

Flexible Cost Benefit Analysis

With BIM, a building owner can compare and contrast all of the different methods, designs, and energy-saving ideas under consideration to observe their impact and calculate the financial return on investment of each energy reduction approach or possible combination of synergistic approaches. That enables interested parties to avoid expensive miscalculations and mistakes while they capitalize upon the best energy-related options for a specific building or situation.

It is easy to analyze the flow of energy flow in and out of a building based on factors including the architectural design, building materials, and structural layout; the forms of energy that are used and the usage patterns of occupants; plus local weather conditions and the orientation of the property. Future energy costs can also be estimated for side-by-side comparisons and cost benefit analysis, and it is even possible to chart life cycle energy costs and perform a comprehensive carbon neutrality analysis.

Customized Calibrations

Before starting the BIM energy reduction analysis, an updated digital model of the existing building is first created to establish benchmarks and as-built measurements based on an up-to-date interpretation of the BOMA standard. The model can be calibrated to exactly reflect the current energy use and utility bills of the existing building, for example, and then the owner can perform any number of creative and informative exercises to find out how those numbers are affected by various changes to the building.

Deploy BIM to examine the dynamic interaction of both internal and external energy sources to calculate a precise net result for the building as a whole. Or identify the energy potential for a planned addition, reconfiguration, remodel or a facility that plays a significant role in energy consumption such as an on-site community laundry facility, swimming pool, or restaurant.

Incorporate data such as room sizes, floor plans, the dimensions and configurations of windows and doors; the insulation value in walls and the HVAC capacity; and the energy consumption impact of occupied units versus vacancies. Input optional information like preferred thermostat settings, the number of occupants, light and equipment power densities, and thermal details for walls, windows, or other components of the structure.

Side by Side Comparisons

Experiment with a simple idea such as installing fluorescent lights in the building, for instance, to reduce energy consumption. Try out a retrofit with energy efficient windows and calculate how much heat that will save in the wintertime or how it will affect air conditioning bills in the warmer months. Study the impact of planting shade trees outside to deflect solar heat — while adjusting for the fact that the new landscaping design will require an irrigation system that increases the demand for water. Perform the same kinds of comparisons to view water consumption rates using low-flow toilets in an apartment building or to study the energy savings gained by installing on-demand water heaters or solar panels.

If an owner is planning to perform similar upgrades on identical buildings that are located in different cities, for example, it is possible to first do a BIM analysis to find out how much the energy savings will differ because of the difference in pricing of utilities in each particular region of the country. Water prices in Toronto, for example, may rise significantly due to the fact that the city's water infrastructure may need to be repaired and upgraded — but an effective BIM energy analysis can factor in the impact of such events to predict future expenses or savings.

Additional Financial Incentives

To add to the appeal of BIM, various government incentive programs such as the BBP Multifamily Energy Efficiency Rebate (MEER) and BOMA ECAP Program are available across North America to help fund the creation of BIM energy analysis initiatives. In fact BIM is so useful that the United States General Services Administration (GSA) now requires BIM models on all its building projects. To determine the effectiveness of BIM, the GSA initially tested it with a two year pilot program. The cost savings on just one of the pilot projects was so great that it essentially paid for the entire nine-project program.

These features and others make a BIM-enhanced perspective the ideal starting point for any energy savings initiative. ❖

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