The "Best" New Commercial Design Assistance Program

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New commercial building designs are generated, perhaps, every day. And although the profession is becoming more cognizant of energy issues each year, we are working with designs informed solely by internal factors. While these are necessary components for striving toward sustainable designs, the consideration of external factors is often overlooked. Factors such as climate and solar position are less tangible items to the architectural design team, and their impact on a building is often difficult to quantify early in the design. However, the early design stages are when some of the most significant decisions are made and when some of the greatest opportunities affecting energy use exist.

One typical method of evaluating operational energy use is via hour-by-hour building energy simulation. Analysis of various factors such as building orientations, forms, envelope systems and landscape design can indicate areas of greatest energy impact. It is often surprising that a previously perceived small change item can have a significant impact on energy use. As useful as energy simulation information can be, however, traditional modeling programs and approaches often provide the information too late and at too high of a cost. For instance, modeling requires detailed information that generally is not available until the design has progressed farther than is ideal to implement new measures. Moreover, setting up a model can be quite time consuming. The time delay can be unacceptable to architects who need quick feedback to know if they should pursue the original orientation and form or begin to address new issues. Finally, the technical nature of constructing the model is usually delegated to the engineer, who often does not have the tools to convey the results in a manner the architect and/or owner can easily evaluate.

British Columbia Hydro (B.C. Hdro) and its contractor, EnerSys Analytics Inc. have designed a process that addresses the need to consider energy-use early in the building design stage while eliminating the traditional drawbacks of energy simulation. B.C. Hydro's Design Assistance program has developed the "Energy Performance Workshop" which brings together B.C. Hydro representatives, the design team, and energy modeling experts to investigate different scenarios and sensitivities that will affect energy use in the new building. By receiving energy and cost information early in the process, the design team is able to make educated decisions early in the design process when changes can be made most easily and cost-effectively.

To analyze the energy use and implications, B.C. Hydro uses a database of similar buildings in the region and a front end spreadsheet to the DOE2 building energy simulation program called the Building Energy Simulation Tool (BEST). Unlike traditional modeling efforts, set up time for energy simulation and sensitivity analysis has been significantly minimized with BEST. With the appropriate setup prior to the workshop, BEST provides information on everything from orientation specific envelope treatments to the optimization of the HVAC system. In fact, feedback for many options can be instantaneous.

The benefit of this process and program is that investigations can be done early in the design, before building orientation and form decisions have been set. The program provides very quick feedback and easy-to-understand results. Perhaps some of the most significant results identified are space conditional load reductions, which can translate to mechanical equipment downsizing, and thus capital cost savings. Most scenarios are analyzed shortly after the questions are asked, allowing for discussion by the entire design and analysis team about any issues surrounding downsized equipment. Oftentimes design decisions are made at this point, and the model is revised accordingly to include in the new design. Thus, the effect of subsequent measures can then be compared to the new baseline.