Dunlap & Partners
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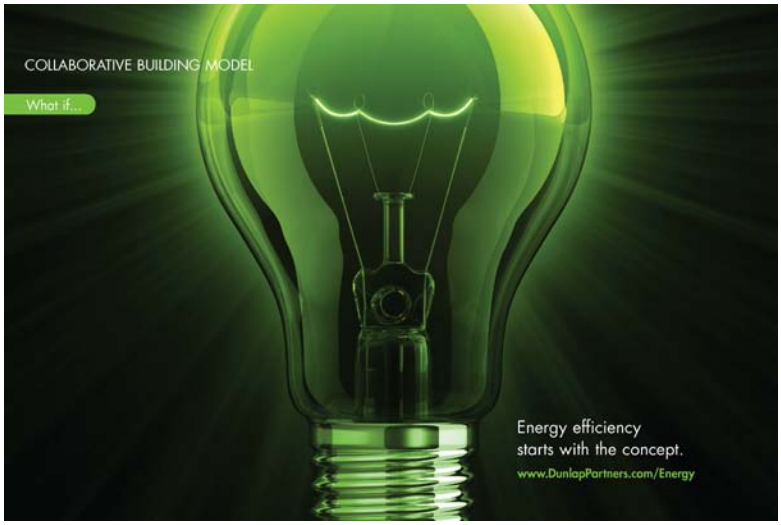
Always asking … "What if …?"

Energy Modeling – Energy efficiency starts with the concept.

A New Version of an Old Concept



The LEED certification process has focused renewed emphasis on energy modeling. Not since the mid-1990's, when utility rebate programs drove the need to demonstrate energy cost savings through software simulation, have we seen the magnitude of energy modeling experienced over the past year. This time; however, there are some modifications to the modeling process.

First, the software that we use now is more sophisticated than the 1990's versions. We are able to model features such as daylighting and heat recovery within the basic energy modeling software instead of using vendor specific rating data or, in the case of daylighting, a dedicated software analysis not embedded in the energy modeling package. The USGBC publishes a list of the software packages approved for use in the LEED certification process. Our firm uses the HAP and Trace software packages. We have, in addition, used the eQuest software package in the past. For those visitors wishing a more in-depth comparison and discussion of various simulation software programs we refer you to www.energyplus.gov. Posted on that site is a paper comparing 20 simulation programs.

Perhaps the most significant difference in energy modeling today as compared to the earlier eras is the requirement for a baseline model. The baseline model is an ASHRAE 90.1 creation. It represents a minimally compliant energy efficient design for a building of identical size, shape and orientation to that of the actual building under

consideration. This requires that the modeling personnel be more than 'computer jocks'. He/she must be familiar with both the software and ASHRAE Standard 90.1. For those visitors with eyes that gloss over at the mention of Standard 90.1, ASHRAE has a condensed version of the Standard's fundamentals entitled 'Standard 90.1 for Architects'. More information on this can be found at www.ASHRAE-eLearning.org.

The Design Process and Relationship must Change

A very interesting and beneficial by-product of the LEED process is the relationship that must be forged among the Owner, the building designer, and M/E/P engineer in order to demonstrate a minimum of 14% energy cost savings with the energy model. Ideally, this relationship begins much earlier in the design process than has traditionally been the case. At concept design, software wizard templates can be used to help optimize building façade and orientation. At schematic design a more developed model can be used to compare HVAC system options, lighting control strategies, and other energy saving measures. That model will be the first quantitative gauge of potential energy cost savings and associated LEED points.

As the team moves through the design process, the model should be fine-tuned and used to understand the building load breakdown. Armed with that information, the team can analyze load reduction techniques and make informed decisions earlier in the design process than has traditionally been the case. The team should understand and take advantage of the energy model in the 'V.E.' process. If V.E. ideas can be tested, validated and accepted or rejected at the design development stage, the distasteful post bid 'valuectomy' procedure can be minimized. Engineers are often criticized for not taking advantage of the load reduction techniques explored during the design process in the final HVAC equipment selections. If the team can commit to early V.E. and hold that commitment through post bid, engineers should reflect that commitment in the final equipment selections. It's about teamwork!

What's Next? B.I.M.

What is down the road for the Owner design team as regards modeling? With the

advent of BIM (3-D modeling) in the design process, the team must be prepared to take advantage of more sophisticated software tools earlier in the design process. Engineers can work with the team during early concept to build 3-D models that can be quickly modified, turned, stretched and tweaked. The team can make decisions on roof types, glass types and quantities, building orientation, insulation values, and shading opportunities much earlier in the design process. Daylighting opportunities can be examined early. All of this feeds into a much earlier and more robust energy model that can explore HVAC options and strategies. Couple this with the early ability to use CFD in exploring HVAC dynamics and we have the ability to compress the design process, improve the quality of the design process and save the Owner construction dollars during the most beneficial period of the building process. That time is nearly here and we can't wait!

How Dunlap & Partners can Help

We are currently modeling or have completed models for numerous LEED projects. We already understand the process and the relationship that must exist among the team members in order to achieve a sustainable building design. If you are considering an energy systems design partner for your next project, consider Dunlap & Partners.