“The Light You Don’t See”

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During a recent CEM training course, I got the opportunity to get an evening tour of Lutron’s lighting showroom in Washington DC. I was impressed and surprised by how well the lighting controls could react to varying ambient conditions and ultimately help reduce lighting loads by 20% to 60%. I thought I would write about some of the neat things that I saw as well as the applications to many buildings in the US.

It was impressive to see so many different building elements working together seamlessly. Of course there were daylight harvesting sensors, which dictated the lumen output of the ceiling fixtures, but there were also window shades, occupancy sensors, scheduling software as well as integration with security card access controls to minimize wasted lumens. Basically, the lighting system included all of these elements to create “scenes” that would apply in different building operating modes (presentation, classroom, office, conference, etc.) and even “scenes” for specific occupants during different times of the day. For example, each area could be customized to particular occupants’ needs… and this empowerment strategy has been correlated with savings.

As with many existing buildings, the operating schedule of the showroom’s office could be programmed into the system such that it will “start up and shut down” accordingly. However during “off hours”, this system was also “listening” for any occupant to arrive. Once an occupant arrives (say on Saturday afternoon), the system recognizes him/her when they swipe their card to gain access to the building. Then the system would note the angle of the sun (pre-programmed) and properly adjust the window shades, then dim the lighting load to account for the available daylight. It would do all of these actions only in the area in which that occupant works. If the occupant deviates from his usual location (going to the kitchen, bathroom, etc.) the system would detect that movement via

occupancy sensors and adjust accordingly. Of course all of the information can be tracked and analyzed for savings computations and further optimization. The 3,100 ft^2 office we toured had achieved a measured lighting energy savings of 20.1 MWh during the past year, and 47 MWh in lighting energy savings since the construction.

What really surprised me during the visit was to experience active light dimming and really not notice it. Our tour guide asked my fellow instructor and I to look at the ceiling lights and watch for a change… we didn't notice anything as the lights were dimmed 20% over a three second period. Now I am biased (believing that I know something about lighting), but I am telling you that over a 3 second dimming period- my eyes could not detect the change (even on the second attempt). This result can be leveraged to many existing facilities. It is well known that when utilizing daylight harvesting, you want the dimming function to be slow and delayed so that occupants don't notice the light intensity going up/down when clouds quickly obscure the sun. However, being able to "get away" with a 20% savings (even without any daylight harvesting controls) does offer some new opportunities. *For example, considering that most US buildings are designed to be "over-lit" to account for lumen depreciation and general light loss over time, then a dimming ballast may offer some extra savings during the first year by "right sizing" the lighting output.*

In the showroom, there were many other new applications that I witnessed in action. Some were "wireless" solutions that offered more flexibility and reduced installation costs that standard "wired" lighting controls. In addition, many of the new control systems are truly "plug and play" addressable devices, which offer more configuration options and savings (energy and setup time).

However, below are some basic calculations for a dimming ballast (assuming you have the daylight harvesting option). If a normal ballast costs $20 and a dimming ballast costs $50, but saves 40% during its first full year (assume a 2 lamp T-8 fixture with 3500 hours/year and 10 cents per kWh); the incremental payback would be:

=($30)/(0.064kWatts/fixture)(.4)(3500 hours/year)($.10/kWh)
= 3.35 years.

Please Note: The average savings from controls was used (i.e. average of 20% and 60. Considering that if you also leverage the dimming ballast to help with demand limiting or even demand response programs, you may be able to substantially reduce energy demand costs with little to zero impact on your occupants.

During your holiday break, I encourage you to get out and look around for new technologies and see how they can apply to your buildings during 2013. I want to thank Shaun Taylor and Todd Teele of Lutron, who stayed open late to give us a fantastic tour as well as an explanation of how the technologies worked. Shaun Taylor can be reached at 202-624-5700 for inquiries about the showroom in Washington DC.