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Interview
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EMAIL INTERVIEW **David Wilson** & **Ken Sinclair**

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Daylighting in Demand Response Situations

The ideal daylight harvesting systems reflects a balance between the energy manager's requirements for ROI, and the HR manager's concerns for occupant satisfaction.

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Sinclair: How do you see the current state of daylight harvesting.

Wilson: Just a few years ago, daylight harvesting was something people only talked. But in the last 5 or 6 years, it has really moved onto the mainstream.

As with many new building technologies, the first systems lacked the proper feature set to accommodate the multitude of user requirements and varying building designs we encountered. Luckily our digital system allowed us to add and upgrade features swiftly.

Once the new features sets were in place, we ran into the second major hurdle: collaborative design amongst disparate disciplines was missing. Typical issues included: unknown ducting which obstructed photocells, window treatments or awnings not communicated to the electrical engineer (responsible for the lighting and daylight harvesting plan), mechanical shade or skylight louver integration requirements not communicated across divisions. Working with other manufacturers and specifiers has ironed much of this out. Coordination is required across divisions for roofing, fenestration, electrical, placement of lighting, space planning (particularly room geometries), and even building orientation). Design issues had to be identified and ironed-out well before plans were ready for bid,

Once this was done (and it remains a constant struggle for all) the next goal became to quell a small tide of user concerns regarding local control. Daylight harvesting is by definition an automatic response of electric lighting to daylight. But to be truly successful, we found the needs of the room occupant for local control also had to be considered. To solve this, LC&D has developed what we call a "semi-self-regulating" user experience; in other words, we empower the room occupant to locally adjust lighting levels, within pre-defined boundaries. To meet the needs of multiple building types and customer requirements, those "boundaries" need to be extremely flexible.

The ideal daylight harvesting systems reflects a balance between the energy manager's requirements for ROI, and the HR manager's concerns for occupant satisfaction (keeping in mind that daylight harvesting might save $1.50 per square foot per annum in energy costs but salary costs equate to about $150.00 per square foot per annum and a drop in morale can be

expensive too!).

Most recently we see an increasing trend to tie-in distributed control strategies such as daylight harvesting, with centralized requirements such as building automation, power use trending, and even utility-side load-shedding. In other words, a holistic energy management strategy.

Sinclair: So how does this tie into Demand response situations.

Wilson: Southern California Edison has stated instead of increasing generation capabilities they are going to make up the increase in electrical demand by energy savings and are making it very attractive for large consumers to sign up for some sort of load shedding during times of high demand. The times of the highest demand are of course when it is hottest and the sun is shining brightly. This works right into the Daylight Harvesting scenario, which reduces lighting power during these peak times. An obvious candidate for daylight harvesting is warehouses. These cover acres of space and are frequently lit with HID or fluorescent lights. Though many of them have skylights not all do, and not all have a control system. With at little as 3% of the roof surface covered with skylights we have seen projects where all lights are turned off during daylight hours with totally adequate illumination within the warehouse. These customers, who usually do not air condition the warehouse, do not need some sophisticated demand response warning system since they are already turned down to the minimum.

A utility can initiate a load-shedding command as needed with a participating commercial power-user. If that power-user also has a daylight harvesting strategy in place, a demand call for load shedding will be less noticeable as loads have already been reduced (depending on available daylight).

Similarly new school designs have been at the forefront of using daylight harvesting since daylight also has a measurable impact on student test results. Though schools may already be saving some energy there are areas where a demand response system can add additional savings and make sure that as little of the school budget goes to electricity as possible. Frequently this is just a matter of putting in a demand response sensor to trigger the additional “Off Sweep” of the lights and applicable air conditioning needed to achieve the savings. With a properly designed daylight harvesting system there is already some sort of control system in the school. If this is also controlling the common areas it is just a matter of programming to make sure that essential lights are left on and the less essential lighting and air conditioning is turned off.

Sinclair: New buildings seem to be getting better but how about existing buildings?

Wilson: Here again we have a goal that can only be achieved by the interaction of companies encompassing different disciplines. We have been working with sky lighting companies that provide both Prismatic and Tubular skylights. They find application in different types of projects with some overlap. These companies run into the standard problem that they can provide the sunlight properly filtered to keep out the heat but until the lights are turned off there are no energy savings. We provide a distributed control system that places the points of control near the loads. This is frequently much easier to retrofit than using a centralized panel. Of course there are situations where a centralize panel works just fine. Such applications would be a factory or warehouse for instance which is installing new skylights. The distributed system is linked by data cable that usually does not need to be run in conduit. This simplifies installation while bringing each point under control. Networked photocells can measure the level of light at the work surface and adjust the lighting and sometimes the louvers that control the amount of light appropriately.

Sinclair: This sounds like something that is appropriate to Southern California but how about locations that are further north and have more variable weather.

Wilson: Skylights are amazing in terms of the amount of light that they bring into a space. Though the hours in the day may be reduced as one goes further north they are still effective as a way of saving energy in almost every part of the USA. The installations that are further north require a more complex control system that can manage the multiplicity of weather and lighting conditions smoothly without irritating the occupants to the point where they bypass the system. We have found that no matter how carefully the system is set up it is vital to be able to call back after a few months and do some tweeking of the system to ensure client satisfaction. Having a system that can be dialed into remotely or accessed over the Internet certainly makes this a lot easier and any customer comments can usually be handled while they are still on the phone.

Sinclair: What do you see as the future for demand response and daylight harvesting.

Wilson: Right now the utilities are working with the “big users” and some work has been done with residential clients. Almost all the energy codes throughout the country are mandating some sort of energy control in commercial buildings. We now see in California that the codes are beginning to target residences as places where energy controls need to be implemented. I see that it will not be long before all new housing is required to have some automatic shut off system that activates on leaving the house. Such a system would have a browser based control center that is hooked to the Internet and can monitor a web page set up by the local utility. By having the system itself monitor the web rather than being accessed remotely we get around all sorts of IP problems. Pre set programming then notes when there are first, second and third stage alerts and uses these to automatically turn off air conditioning, pool pumps and other loads. By making it automatic one gets around the problems encountered in the voluntary systems tested in San Diego where the initial response was positive but after several months the home owners lost interest and the savings eventually dwindled down to almost zero in most households.

In conclusion I would say that we have only just started to realize the energy savings that can be accomplished. As controls become more of a commodity item and the populace become better educated in what they can do we will see more and more businesses and houses become “net zero” loads on the grid.
