

Light into the Light

Global lighting experts point to new energy-efficient lighting technologies, daylighting and interior designers themselves as the key ingredients to a sustainable future.

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The U.S. Department of Energy (DOE) estimates the global lighting energy bill at around \$230 billion per year. In the United States alone, lighting maintains a solid 20 to 25 percent of the overall electrical energy consumption, with commercial and industrial lighting making up a large part of that statistic. “We have been struggling with the issue of lighting energy efficiency since the oil embargo of 1973,” says James R. Benya, Professional Engineer, Fellow of the Illuminating Engineering Society of North America (IESNA) and Principal of Benya Lighting Design in West Linn, Ore. “To the credit of lighting, we have made significant improvements since that point, substantially dropping average energy use since 1973. But energy restrictions are getting stricter, and architects, engineers and interior designers will need to make a mental shift and learn to design certain things differently.”



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Since the mid-1970s, the DOE has invested \$70 million in research and development at the Lawrence Berkeley Laboratory for development of advanced energy efficient building technologies, software and standards. “That investment has helped spawn a \$2.4 billion U.S. market for key products like energy-efficient lighting and advanced window coatings,” says Evan Mills, Ph.D., Energy and Green Buildings Analyst and Staff Scientist at the DOE at Lawrence Berkeley National Laboratory. “By 1993, DOE’s initial investment had reduced consumers’ energy bills by an estimated \$5 billion. By 2015, we estimate that the

products of that investment will save consumers \$16 billion annually.

To continue these strides, Benya believes the single most important mandate is to continue the trend toward even lower lighting energy use, and he believes interior designers are going to have to learn to do more with less. “That will be a big shock for many of them, especially in the immediate future when the cost of lighting rises,” he says. “But the money saved in energy will pay for that very quickly.”

BIG STRIDES

The 2000 installation of the U.S. Green Building Council’s Leadership in Energy and Environmental Design (LEED) rating system has affected the lighting design industry profoundly. “No single newcomer to our world of standards and regulations has had more impact than LEED,” Benya says. “For the first time, it’s levelled the playing field and given the construction industry a workable, common-sense, practical and complete tool for evaluating sustainability.”

In fact, the new category for commercial interiors – LEED-CI – is a very important standard for interior designers, because it allows them to accrue points in relation to how much their designs meet – and exceed energy codes, Benya says.

San Francisco-based architect Richard N. Pollack, FIIDA, FAIA, past IIDA President and Managing Principal of Richard N. Pollack and Associates, says the biggest sustainable lighting obstacle facing interior designers is keeping abreast with rapidly advancing technologies



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LEADING LIGHTING TECHNOLOGY

Award-winning lighting designer Stefan Graf says energy efficient lighting techniques and technologies are now moving so quickly that interior designers need someone on their team with a complete dedication to the specialty. “Probably 98 percent of interior designers are still selecting lighting on the basis of its decorative qualities,” says Graf, Principal of lighting design firm Illuminart in Ypsilanti, Mich., and member of the International Association of Lightings Designers (IALD) Sustainable Design Committee and the Illuminating Engineers Society (IES). “That’s no longer good enough. They need

to have a designated lighting person who goes through an educative process, attends seminars and spends 80 percent of their time on lighting issues. At the very least, they need to align themselves with lighting consultants.”

Both Graf and Benya point to *T-5* technology as one of the most important lighting advancements in recent history. *T-5* and *T-5HO* are lighting systems best suited to new ideas in fluorescent lighting. The systems are characterized by lamps that are smaller, lighter and permit more appealing luminaire designs than are currently found in state of the art lighting designs. The *Super T-8* is a competing technology that has the advantage of lower initial cost. It also can be used directly in virtually all *T-8* and *T-12* luminaires by simply changing lamps and ballasts. *T-5* has the advantage of being smaller and allowing luminaire designs of smaller size and/or higher optical efficiency, but both produce excellent energy efficient results. “Skinny tubes are our future, and embracing that technology and getting it into the

mainstream is essential,” Benya says. “*T-5* has given rise to a whole new generation of products.”

Graf says *T-5* technology gives opportunities for fixture designs to be more creative and aesthetically pleasing and for lighting designers to provide more creative patterns of light and color within a space.

The light-emitting diode (LED) market also is developing fast. “At the moment, LEDs are too expensive for the mainstream and their efficiency ratings are not yet up to standard,” says Jennifer Brons, a research specialist for lighting applications at Rensselaer Polytechnic Institute’s Lighting Research Centre (LRC) in Troy, N.Y. “But we’re hopeful of a big future for the technology. It has introduced a whole different way of creating lighting, it allows us to put light in new places – and you don’t have to change light bulbs!”

Pollack agrees. “Designers are keenly aware of new technologies for commercial contract interior lighting, especially LED systems.” “And we are waiting with baited breath for their true unveiling.”

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WHAT ABOUT FREE?

New technologies are just one element in the quest for energy efficient lighting solutions, with natural daylight harvesting being the most important tool in that quest. “The beneficial biological effects of daylight on humans are now quite clear,” says Lars Bylund, Ph.D., IEA, Professor of Light and Energy at Norway’s Bergen University School of Architecture and a lighting designer for leading manufacturers like Louis Poulsen A/S in Denmark. “And if we are talking about efficient lighting and sustainability, those benefits are very important. Architects and interior designers have a responsibility to utilize daylight more.”

Interior designers can support daylighting with careful choice of interior colors, smart furniture placement in relation to windows and skylights, the removal of solid interior partitions, use of reflective surfaces and occupancy sensing and dimming controls. “We have been working with European office furniture manufacturers to integrate reflective surfaces that will harvest the daylight and reflect it further into office interiors, but it is still too early,”

Bylund says. “I saw moves in this direction at the Cologne Furniture Fair in Germany two years ago, but it was ahead of its time then. There are enormous possibilities for innovation in this field and with more interest in global energy conservation I think there will be a huge shift in this area.”

Brons also is excited about the new daylighting control systems. “Occupancy sensors are now a mature technology and well accepted in the industry, and they are starting to be incorporated into actual luminaires rather than as separate systems,” she says. “That’s promising, because a lot of the commissioning hassles are reduced.”

Benya says he already is using photo-sensing in daylighting but warns others that it is still a very immature industry. “Ultimately, daylight harvesting will be one of the most important things we do,” he says. “But in order for it to work, you have to have good daylight in the beginning. Sadly, architects stopped learning about daylight in the 1950s when we got the fluorescent lamp and air conditioning. They are only beginning to learn about daylighting again now.

“We now need a new grounding philosophy,” Benya says. “We need a sound leadership to tell us what good daylighting is; and we need people in the process with thoughtful input. Thankfully that is happening, but it has to move quickly into the schools so further research can get underway”

Toward that end, designers must realize that from a lighting standpoint, it is no longer business as usual. “They have a lot of specialized knowledge to learn,” Benya says. “Some will do it willingly; for some it will be a challenge, and for others just a big nuisance. It’s all about rising to the challenge.”

Graf agrees. “The benefits of sustainable lighting are substantial,” he says. “There are human and environmental benefits, cost benefits to the client and benefits to the users of a space. There are a lot of products being developed to enhance daylighting – light pipes, solar collectors, shading systems, glazing systems, reflectors – the list is endless. The world of lighting has evolved beyond simple foot-candle calculations and fixture selection to become a silent design partner.” 