SSL Postings
U.S. DEPARTMENT OF ENERGY

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Even Deeper Energy Savings

At DOE's ninth annual Solid-State Lighting Market Development Workshop, which was held in Detroit last month, there was considerable discussion about the fact that, even though SSL is already saving energy, it's only a drop in the bucket compared to the potential savings. The 188 tBtu of electricity that SSL saved in the U.S. last year may sound like a lot (after all, it's worth $1.8 billion and is enough to power more than 1.5 million homes), but according to DOE estimates, the technology has the potential to save the country 4,060 tBtu a year—which means that more than 95% of that potential remains untapped.

The question then becomes: what will it take to get to the point where all of SSL's energy-saving potential is fulfilled? In order to answer that, we have to first consider where the additional energy savings will come from. There are three main sources. The first, and most obvious, is through further improvements in efficacy. LED chips, lamps, and luminaires have been steadily becoming more efficient, to the point where there are now products on the market that exceed 100 lm/W. While that may have seemed out of reach a few years ago—just as 60 miles per hour did back in the horse-and-buggy era—it's less than halfway to DOE's ultimate target of 250 lm/W, which researchers believe is the efficacy limit for phosphor-converted and hybrid LED packages using standard drive conditions. At the rate things are evolving, we should hit 250 lm/W by 2030, if not sooner—and the various barriers that stand in the way of that will be explored next month in San Francisco at our 12th annual SSL R&D Workshop.

A second source of deeper energy savings with SSL will come from the increased use of controls, which was another hot topic of discussion at last month's workshop. There's widespread acknowledgement that the use of controls can drastically reduce wasted light—to the point where it appears to be a given among stakeholders that the future of solid-state lighting will involve such pairings. That's not surprising, since SSL has the potential to be more easily controllable than other lighting technologies. I say "potential," because there are a number of hurdles yet to be overcome in this regard. Chief among these is the issue of interoperability. Control-system components that are made by different manufacturers may not be able to talk to each other or perform expected functions, which makes control systems vulnerable to a range of potential

problems. Consider what would happen, for example, if your household wireless router failed, and the replacement router you purchased could only talk to devices that were made by the new router's manufacturer. The same problem can arise with control systems, although a number of industry groups are working hard on the issue.

The third source of deeper energy savings with SSL will come from increased adoption. No matter how efficient a technology is, it won't save any energy at all unless people—and lots of them—actually use it. Last year, LED lighting's U.S. market share was 3%, based on percentage of lumen-hour sales. That share is rapidly rising but still has considerable scope for improvement. A big factor in increasing SSL adoption is price, which continues to drop. But another factor is solid-state lighting's "value-added" functionality. That is, we expect SSL to save energy, but as we heard in Detroit, the deciding factor that tips the balance for many consumers may end up being the technology's other advantages—not just its controllability, but also such things as its long life (which reduces maintenance), directionality (which minimizes light pollution), and color-tunability. This latter advantage (which, again, was the subject of much talk last month in Detroit) goes well beyond aesthetic considerations to encompass a range of intriguing potential uses—from improving mood, performance, and productivity to promoting well-being and health. DOE's mandate is to save energy, so anything that promotes that—such as these value-added benefits—plays an important role.

The payoff is worth it. DOE estimates that by 2030, SSL could cut national lighting electricity use nearly in half, the equivalent to saving 3,000 trillion Btus a year—which is the annual energy consumed by 24 million American homes, is worth $26 billion, and would reduce our greenhouse gas emissions by 180 million metric tons (the equivalent of taking 38 million cars off the road).

That's why it would be a mistake to let up now. Much has been achieved already, but the best is yet to come.

As always, if you have questions or comments, you can reach us at postings@akoyaonline.com.