SSL Postings

The impressive strides made by solid-state lighting – which were so much in evidence at the U.S. Department of Energy's (DOE) sixth annual SSL Market Introduction Workshop, held in Seattle a few weeks ago – were made possible by an extensive amount of research and development. Not just core research and product development, but also manufacturing R&D, which helps ensure that products are well-designed and cost-competitive as well as high-performing.

That's why manufacturing R&D was launched as a major initiative by DOE in 2009 to enhance the quality and lower the cost of SSL products through improvements in manufacturing equipment and processes, and to foster a significant manufacturing role in the U.S. Central to that initiative is DOE's SSL Manufacturing R&D Roadmap, the 2011 edition of which was just published.

The Roadmap is updated each year, based on the input from a series of expert roundtables as well as discussions at the SSL Manufacturing R&D Workshop, which this year was held in Boston in April. An important goal of the Roadmap is to guide DOE's manufacturing R&D program and help direct funding solicitations. But it also provides guidance for equipment and material suppliers, based on industry consensus on the expected evolution of SSL manufacturing – thereby reducing the risk, and ultimately the cost.

Each year the Roadmap's focus is re-assessed and priorities are identified. The latest edition offers a tighter focus with a smaller number of priority tasks. It wasn't easy narrowing these tasks down,

but DOE eventually selected two priority tasks for LED manufacturing R&D and two for OLED manufacturing R&D.

The 2011 LED tasks include supporting the development of flexible manufacturing of state-of-the-art LED modules, light engines, and luminaires, as well as the development of high-speed, high-resolution, nondestructive test equipment with standardized test procedures and appropriate metrics. The OLED tasks focus on supporting the development of manufacturing equipment enabling high-speed, low-cost, uniform deposition of state-of-the-art OLED structures and layers, as well as the development of advanced manufacturing of low-cost integrated substrates and encapsulation materials.

As we heard in Seattle, SSL costs are coming down rapidly. For example, although LED replacement lamps were priced quite high just a year ago, by the end of 2010 it was possible to find a 60W A19 replacement lamp for about $50, a price point that's now dropped to $40. The falling prices, combined with the energy savings and other advantages, continue to reduce the payback period for a growing number of lighting applications. But there's still quite a ways to go before such lamps can compete on a first-cost basis, which is why the key cost elements were examined more closely in preparing the 2011 Roadmap. Future cost reductions will not just come from the LED package or OLED panel, but will require a system-level approach to luminaire design and improvements in all areas of manufacturing, including equipment and processes.

Cost reduction doesn't happen automatically; it happens because manufacturers innovate and come up with less expensive ways of doing things. That requires rethinking the way things are done and making significant changes, which is happening across the industry.

It's important to note that SSL manufacturing includes not only the manufacturers of chips and luminaires, but also those who make the equipment used to manufacture those chips and luminaires. So it's

the entire manufacturing infrastructure, much of it based in the U.S., that's benefiting from the growth we've been seeing in the SSL market.

Like that market, DOE's SSL Manufacturing R&D Roadmap is a work in progress that's subject to continuous improvement. It's a living document, and as such becomes more comprehensive, refined, and detailed with each revision. To download a PDF copy, visit www.ssl.energy.gov/techroadmaps.html.

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