Postings: from the desk of Jim Brodrick

It's that time of year again, when our thoughts turn to flowers, picnics, baseball ... and the DOE Solid-State Lighting R&D Multi-Year Program Plan (MYPP). As you know, the MYPP – which guides DOE's SSL R&D implementation as well as our funding solicitations – is updated each year to keep pace with SSL's rapidly evolving technology and ever-changing marketplace. The 2011 version was posted online a few weeks ago, but since then, some sharp-eyed readers have raised a few issues. We've always said that the MYPP is a living document, so now we've "re-released" it with updated information. Most significantly, we've found reason and rationale to raise the LED efficacy targets. So if you downloaded an earlier version, please visit the website again and download the new one.

The annual process of updating the MYPP is not carried out in isolation, nor is it the sole province of those of us working within the confines of DOE. In fact, it's an open and highly collaborative team effort that involves a wide range of industry experts representing various segments of the supply chain.

The process starts with a series of roundtable discussions and conference calls that are held each fall to advise DOE on which R&D tasks are currently most needed to advance SSL. Those proposed tasks are then discussed at length at DOE's SSL R&D Workshops, which are held each winter – this year's taking place in San Diego in February. Separate workshop breakout sessions for LEDs and OLEDs are held specifically to discuss these updates, and anyone in attendance who wants to can weigh in – with

everyone being urged to do so. All of the comments we receive are taken into careful consideration in preparing the updated MYPP.

Last year's MYPP identified 62 tasks that should be considered to support key near-term research requirements, but for funding purposes those were narrowed down to just 20 in early 2010, of which several had low response from the R&D community to the solicitation. Because of this, as well as likely funding constraints in 2011 and the difficulty of handling too many areas of interest at once, the goal for this year was to come up with no more than 10 priority tasks to advance solid-state lighting. Participants at the November 2010 roundtables came up with 14, which were later narrowed down with help from feedback from the San Diego workshop, and also reviewed DOE's efficacy targets and milestones for LEDs and OLEDs.

A number of those targets and milestones have been revised to reflect recent progress, the LED package and luminaire milestones being one example. The 2010 performance and cost targets for cool- and warm-white LED packages were essentially met, and we expect to see a high-efficiency, warm-white luminaire on the market by 2012 that has an output of 1,000 lumens and an efficacy of 100 lm/W. In the right applications, that level of performance will be able to compete quite well with traditional lighting technologies.

In general, the 2011 MYPP critical tasks were chosen to address the areas of greatest remaining potential for efficiency improvement, in terms of the progress made to date relative to the DOE performance targets for 2020. For LEDs, the Core Technology tasks focus on emitter materials, with special emphasis on reducing thermal sensitivity and gaining a better understanding of the "droop" phenomenon, as well as improving phosphor quantum yield and thermal stability. Droop remains a particularly tough nut to crack, but its solution will lead to substantial increases in the efficacy of LEDs.

Product Development tasks for 2011 include collecting and

analyzing system reliability data for luminaires and their components, with an eye toward developing software to model SSL reliability and lifetime – a key issue that's being addressed by a special Lighting Facts working group. Also on the MYPP critical-tasks agenda: developing alternative substrates as well as novel LED package and module architectures that address such issues as efficacy, thermal management, cost, color, optical distribution, electrical integration, sensing, and reliability. LED packages are commonly stand-alone components; that is, you can hook them up and get light. Novel packages might eliminate some extra parts – for example, with "LED boards" that are engineered to fit into the luminaire – which would not only lower the cost of materials but also reduce heat-transfer requirements.

For OLEDs, the 2011 MYPP Core Technology critical tasks focus on reducing voltage, increasing external quantum efficiency, and improving lifetime, as well as on developing new optical designs to improve light extraction, which remains a major barrier and is trickier with OLEDs than with LEDs. Many of these threads are interrelated. For example, in order to be affordable, OLEDs also need to be brighter – but that typically shortens the lifetime. Voltage also affects efficiency, but in a more complex way that, for example, depends on the choice of electrode materials.

OLED Product Development tasks include developing low-cost, scalable designs for larger-area panels. At present, many OLED devices are too small to be practical, but larger panels offer new challenges – such as maintaining uniform voltage, sealing out moisture over a large area, and overcoming more difficult light-extraction requirements.

The Multi-Year Program Plan is the most important element of DOE's solid-state lighting R&D program, because it determines the direction we take as well as the destination we set course for. It also presents an updated picture of where the industry is today, compared to last year. So I invite those of you who are interested to

check out the 2011 MYPP.

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