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## OLEDs: better off once the delusion is dead

**W**hen fiscal times get tight, R&D budgets fade. I realize that, at first glance, this statement seems elementary and obvious. However, you may be surprised by how quickly those with a vested interest in finding exceptions to the rule can rationalize them.

How does this relate to OLEDs (organic light-emitting diodes)? The technology is still largely in the R&D realm, with a few low-volume-production exceptions. Yet, Samsung in December

forecast that, once everyone had purchased an LCD TV, the company would be able to upgrade consumers to OLED-based displays. The very next day, Sony announced massive layoffs and budget cutbacks.

Sony is the same company that in late September 2007 introduced and, at the subsequent CES (Consumer Electronics Show), showcased an 11-in., \$2500 OLED TV that it managed to get into limited production—an OLED TV that quickly ended up in Sam's Club's bargain bin precisely because it was minuscule, expensive, and power-hungry. In addition, the TV's screen had a short life span.

So, Samsung, which hasn't yet brought an OLED TV to market, thinks it will move the world from LCD to OLED in a few years. And Sony, which has brought an OLED TV to market, is rapidly retrenching, especially in risky technology areas.

I've always found the LCD-killer aspirations of OLED supporters to be a fool's delusion. On the one hand, I understand them: Televisions, stand-alone computer monitors, and laptop-inclusive displays collectively compose a huge amount of LCD volume

each year, and snagging even a small percentage of that business is nothing to sneeze at. When I try to think of what might motivate an LCD customer to seriously consider a switch to OLED, however, I draw a blank.

Self-illuminated OLEDs could have had a slender chance in the CCFL (cold-cathode-fluorescent-lamp)-backlight era. One may make a credible argument that CCFLs, although a low-cost and proven technology, were too thick, too power-hungry, or too uneven in their illumination to keep up with evolving high-volume computer- and TV-display requirements. But fast-ramping and cost-effective LED backlights make tangible—and more than sufficient—improvements in all of these areas.

Don't get me wrong. Plenty of applications for OLEDs do exist, which, for example, require screens so small that it'd take an innumerable volume of them to fill a single LCD glass plate. Applications exist for which any backlight thickness—or, for that matter, incremental power consumption—would be a deal killer, or at least a major hassle to design around. Applications exist that can exploit OLEDs' flexibility and

other unique attributes. And applications—consumer electronics, for example—exist that can tolerate OLEDs' limited lifetimes.

A historical analogy: From the beginning of flash memory's life in the mid-1980s, pundits proclaimed the pending demise of DRAM. After all, flash memory's single-transistor structure rendered it even more lithography-scalable than DRAM's transistor-plus-capacitor combo, and, unlike DRAM, flash memory was nonvolatile. However, flash memory's low write speeds, even lower erase speeds, lack of per-bit erase capability, and not-unlimited erase-cycle counts were deal killers.

History proved the more conservative stance but only after a lot of time, money, and manpower were spent foolishly chasing after the DRAM-killer dream. Flash memory did end up clobbering EPROM and mask ROM, arguably due to the volume-boosting assistance of two unstable software applications: PC-power management and the GSM (global-system-for-mobile)-communications digital-cellular protocol. But the bulk of flash memory today sells into mass-storage applications tailored to its strengths and able to deal with flash's shortcomings.

The initial hype for OLED is already deflating and will continue to do so. Slowly but surely, OLED-optimal applications will emerge and ramp, and additional OLED volume will come from applications that LCD vendors consciously choose to exit. It's conceivable that LCD-glass-economics trends will eventually translate into panels that are too big for most potential customers' needs, thereby prompting a widespread OLED conversion. But don't hold your breath waiting for that day to come anytime soon. **EDN**

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