2010: a tremendous year for MOCVD suppliers, but will it continue in 2011?

Ross Young of IMS Research forecasts that, driven by demand from China, emerging solid-state lighting, and continued penetration of LED backlighting, the metal-organic chemical vapor deposition market may exceed 1000 tools in 2011.

A record fourth-quarter 2010 capped a remarkable eight quarters for leading MOCVD reactor makers Aixtron and Veeco. MOCVD shipments to produce blue/green LEDs from suppliers Aixtron, Applied Materials, Jusung, Veeco and Taiyo Nippon Sanso rose for seven consecutive quarters (as shown in Figure 1). Tool shipments were up a remarkable 250% from 228 in 2009 to 798 in 2010.

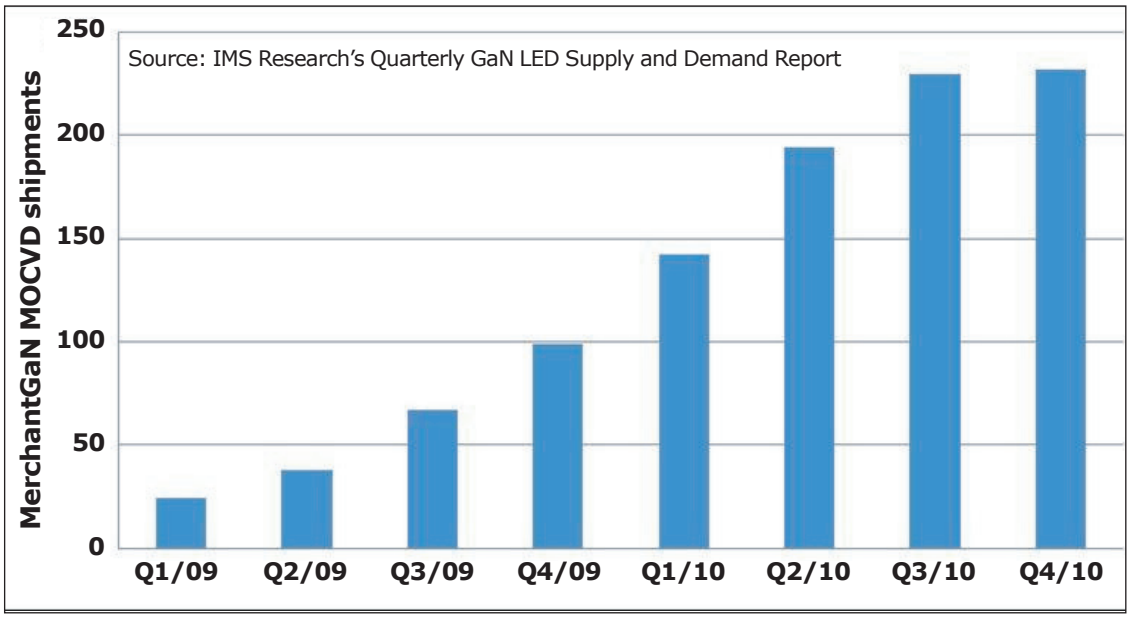

Figure 1: Q1/2009–Q4/2010 GaN MOCVD shipments.

Aixtron and Veeco continued to dominate this market (see Figure 2), accounting for a 97% share in 2010 despite a number of new entrants. As one of the early players in this space, Aixtron has many more tools installed than Veeco, offering both horizontal and vertical approaches and multiple platforms of each approach and consuming less gas than the latest Veeco tools. Also, until recently Aixtron had a healthy advantage in tool capacity in the form of the CRIUS II and G5. As a result, Veeco must often unseat Aixtron to win business, which has

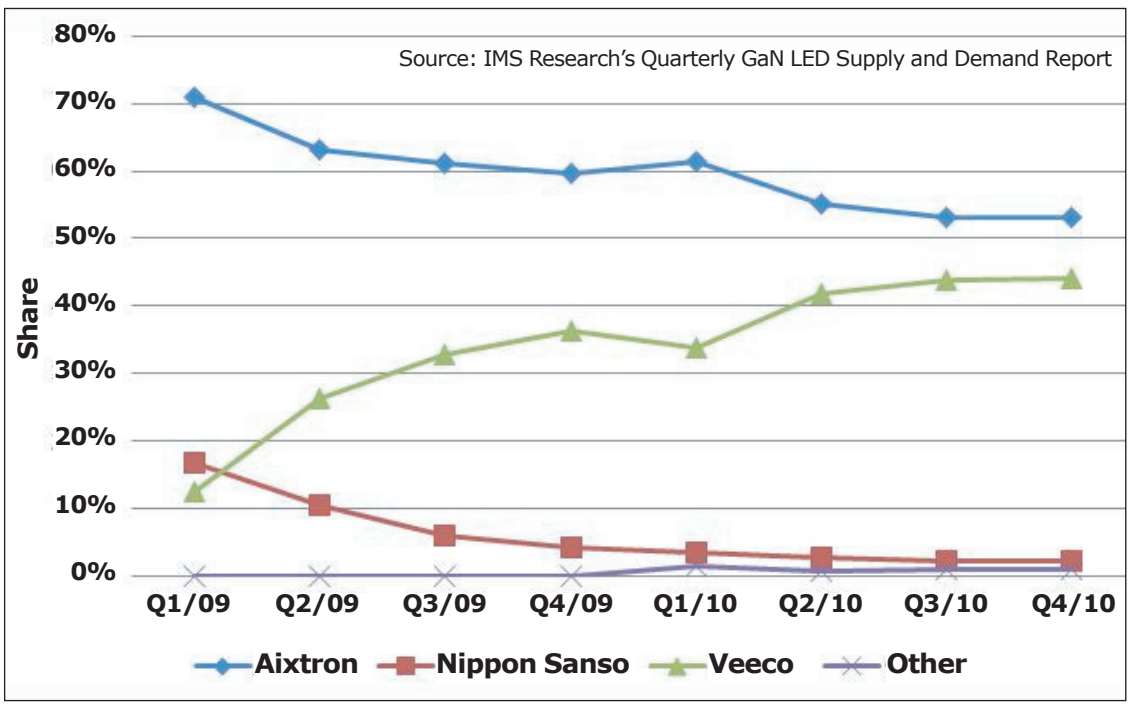

Figure 2: Q1/2009–Q4/2010 GaN MOCVD supplier share.

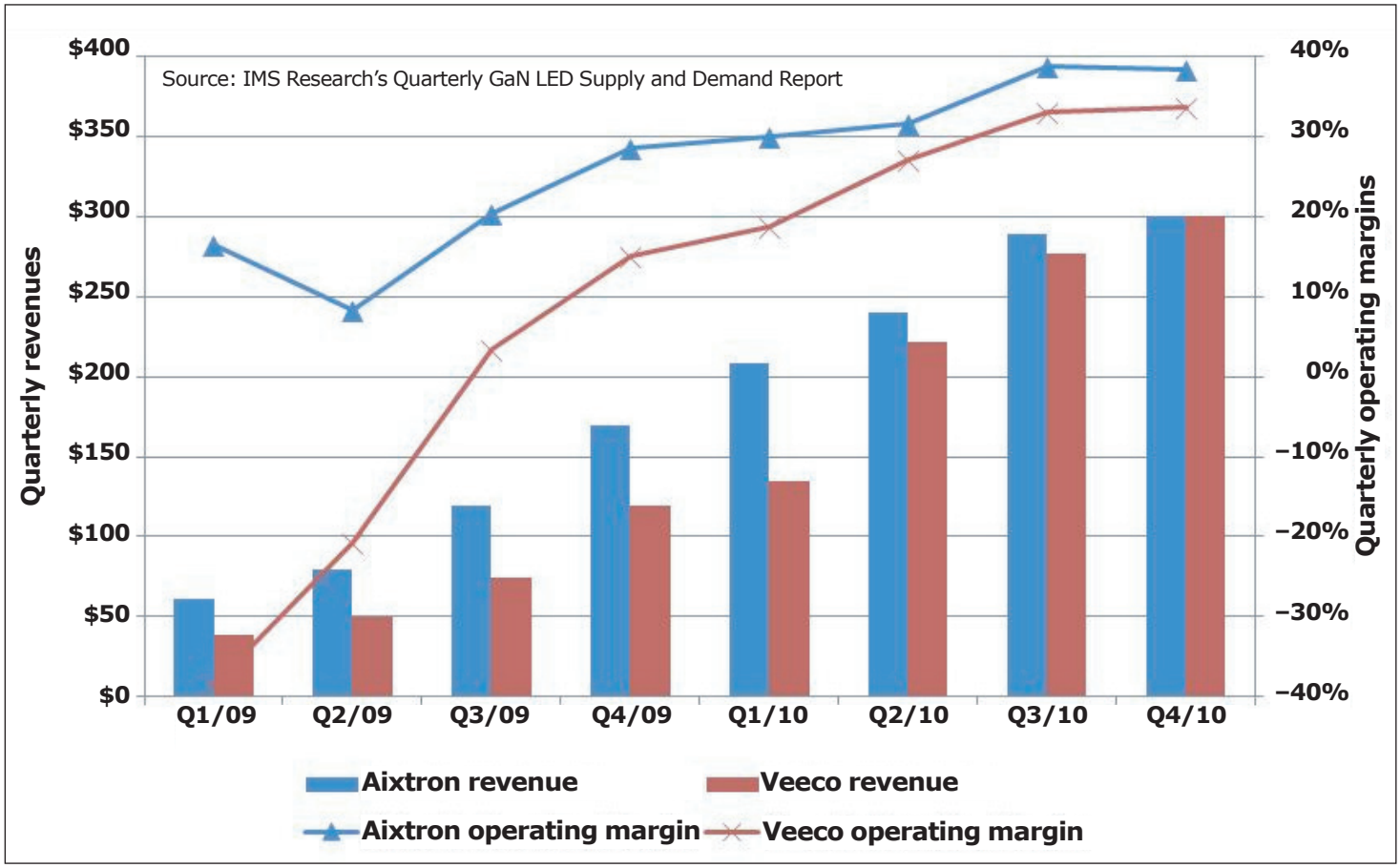

Figure 3: Aixtron's and Veeco's quarterly revenues and operating margins.

not been easy given existing players' familiarity and acceptance of Aixtron tools and their capacity advantage.

However, Veeco has proven it can take share from Aixtron, as shown in Figure 2 with its unit share rising from 31% to 42% from 2009 to 2010 on the acceptance of the K465i (which is believed to generate fewer contaminants in the process chamber, resulting in less maintenance and higher uptime). Veeco has won significant business in China and Korea over this period and has also started improving its share in Taiwan, where Aixtron has long been dominant. As a result, for the past two quarters, the K465i was the LED industry's best-selling tool. In addition, in early 2011, Veeco scaled the process chamber to sizes comparable to the CRIUS II and G5, mounted 2–4 process chambers on a central transfer chamber, and accelerated its temperature settling time capabilities, setting a new standard for industry throughput in its new MaxBright GaN MOCVD 'cluster' system. With just a 13% share in Q1/2009, Veeco has made significant progress.

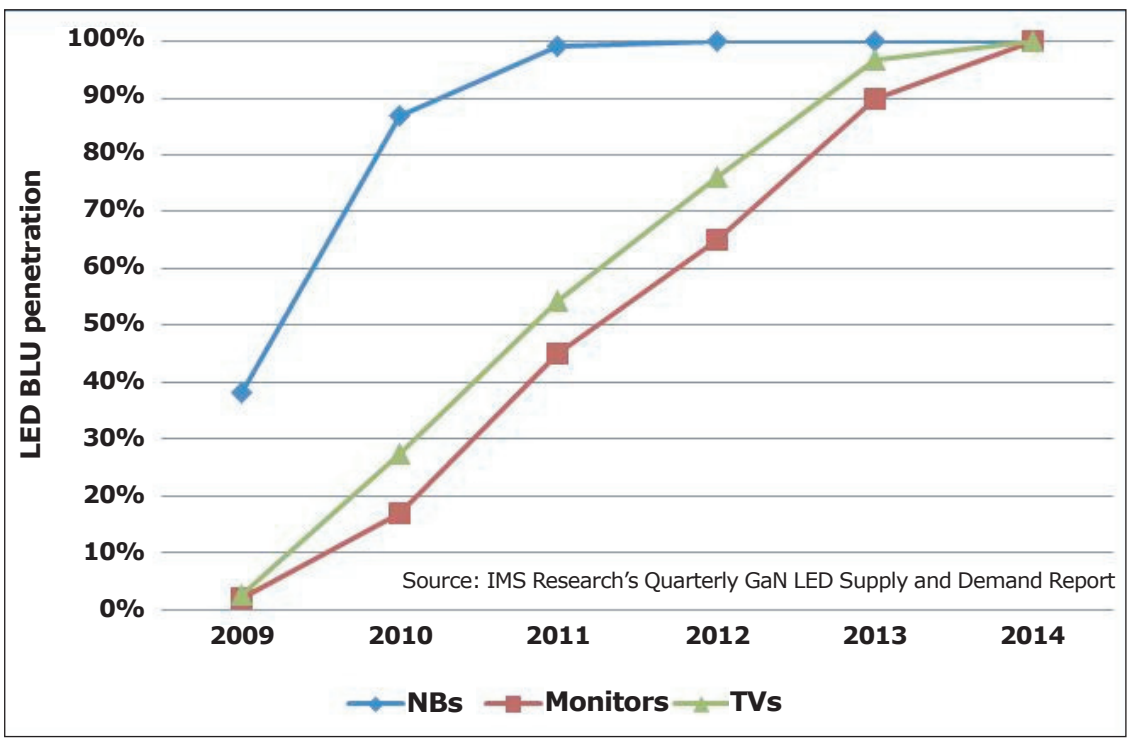

Figure 4: LED backlight penetration by application.

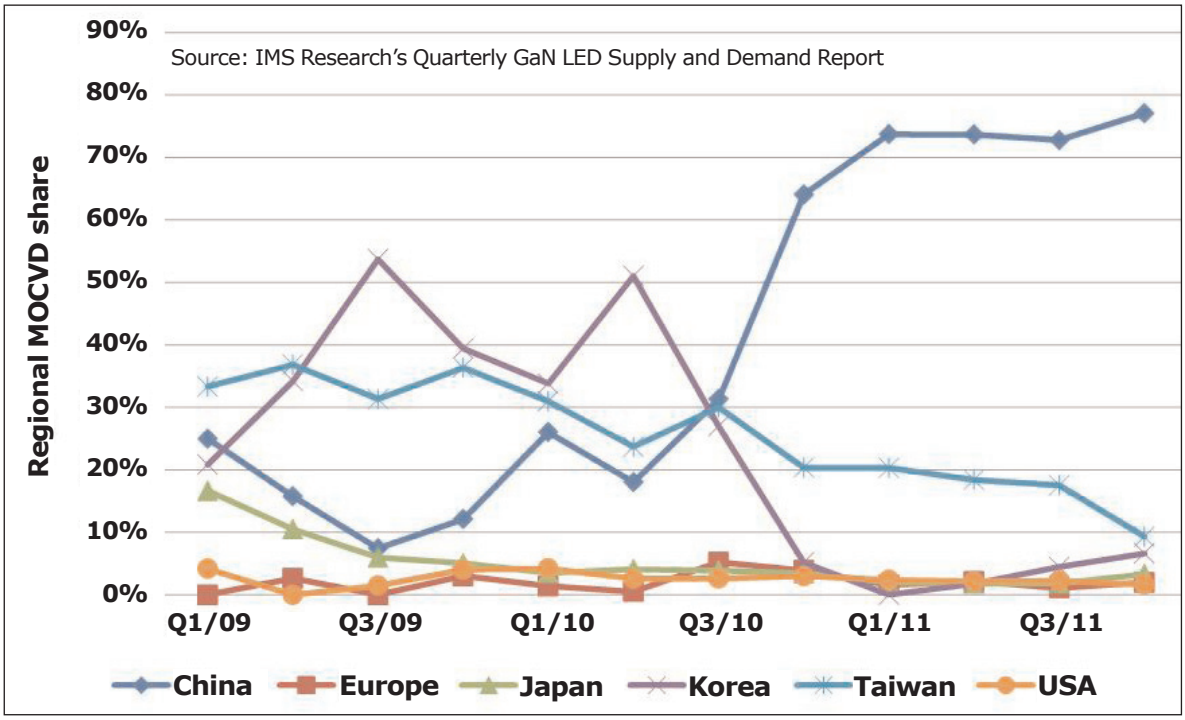

Figure 5: Regional MOCVD demand.

If you look at each company's financials, you can see that both have come a long way very quickly, as shown in Figure 3. Aixtron's revenues rose 142% in 2010 to over $1bn, while Veeco's revenues grew even faster, up 230% to $933m. In addition, the firms also became highly profitable, with Aixtron's operating margins rising from 21% in 2009 to 35% in 2010 and Veeco's growing from –2% to 30%, a dramatic improvement.

Of course, the reason for all of this sudden growth is the rapid adoption of LEDs into backlighting (as shown in Figure 4) and the potential for widespread adoption of LEDs into general lighting. In backlighting, LED costs have come down to similar levels to the incumbent cold-cathode fluorescent (CCFL) technology, up to panel sizes of 15–17". In addition, with premiums and costs continuing to fall at larger sizes while offering numerous advantages (including thinner form factor, lighter weight, increased portability, no mercury, faster turn-on times etc), penetration will continue to increase. For general lighting, LEDs are priced at much higher premiums and will require continued cost reductions before seeing a similar uptake. However, general lighting represents an enormous replacement market. The combination of these two and other smaller opportunities has existing LED manufacturers significantly expanding capacity while also attracting numerous new entrants. In fact, we show over 30 new players receiving MOCVD tools in 2010 and 2011, excluding JVs in China (which would easily grow this figure closer to 40). With more than 90 firms now buying MOCVD tools, it has created a much larger market.

With subsidized demand from China, solid-state lighting beginning to emerge as prices fall, and LED backlighting continuing to gain ground, we do not see the MOCVD market slowing down in 2011. The merchant MOCVD market may exceed 1000 tools

This rapidly growing market has also produced significant changes in regional demand. As shown in Figure 5, Korea and Taiwan dominated MOCVD installations in 2009 and through first-half 2010, but in second-half 2010 China became the leading region and dominated Q4/2010 installations. We expect China's share to remain dominant in 2011 as well for a few reasons. First, the Chinese government has established significant incentives to make LEDs in China, resulting in large tool subsidies, tax breaks, and discounted or free land, among others. Second, with the incentives administered at the provincial level, some provinces are ending their subsidies ahead of plan due to other priorities leading to accelerated deliveries in those areas. Third, a number of provinces are competing to attract more investment in their regions and are offering additional incentives which are expected to continue beyond the original MOCVD subsidy plan. Fourth, the Chinese government has created a large street-lighting program (resulting in strong domestic lighting demand) and is expected to continue to foster a domestic LED lighting industry and eventually include domestic content requirements supporting LED manufacturers based in China.

With subsidized demand from China, solid-state lighting beginning to emerge as prices fall, and LED backlighting continuing to gain ground, we do not see the MOCVD market slowing down in 2011. Based on our survey of LED manufacturers worldwide, we believe the merchant MOCVD market may exceed 1000 tools for the first time in 2011, up 37%, producing another excellent year for MOCVD manufacturers. ■

Author: Ross Young, senior vice president, Displays, LEDs and Lighting, IMS Research.
www.ledmarketresearch.com