

LED investment to recover in light of solid-state lighting adoption

After two years of decline, LED epi/chip equipment spending is stabilizing in 2014 and will grow in 2015, says Clark Tseng of SEMI.

During the LED Taiwan and LED China events in March, participants were optimistic about the LED market outlook due to rising adoption for general lighting.

An early indicator is that LED chip makers and packaging houses in Taiwan are posting much stronger revenue growth in first-quarter 2014 compared to the same period last year.

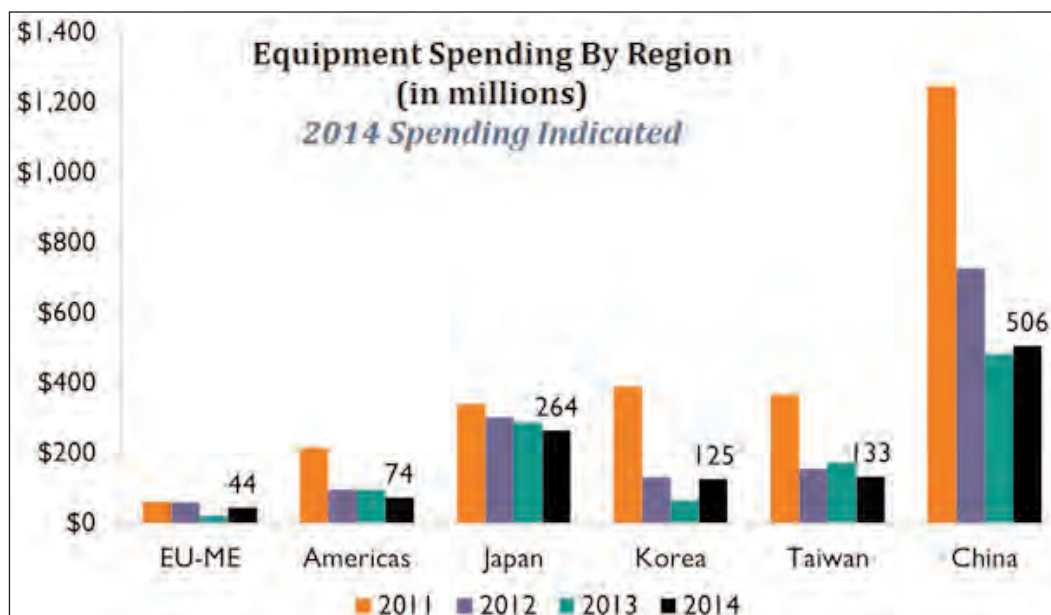
While the LED industry is eyeing soaring growth of the lighting market, the 'legacy' LCD panel backlight markets is actually performing admirably. For smartphone and tablet LCD panels, LED demand is driven by growing screen size, higher resolution, and better color reproduction. In terms of TV backlighting, even though LED backlight penetration has nearly reached 100%, the growth will still come from growing average TV screen size and the rise of Ultra HD 4K TV, which will consume more LED chips.

The LED illumination market is now in the fast growth stage of its product life-cycle. Some forecasts are predicting that LED lighting adoption will grow more than 50% annually over the next three years. Currently, the largest LED lighting market is retrofit lamps. Various vendors are aggressively pushing 40W/60W-equivalent LED bulbs to the market. With the banning of incandescent bulbs and the rise of environmental awareness, consumers are more willing to choose LEDs over other alternatives. Besides retrofit lamps, other major lighting markets — e.g. outdoor, retail & hospitality — are expected to drive further growth in the years to come. Both Government advocacy and consumers' adoption will be the locomotive of LED market growth.

From the LED makers' point of view, the competition has now swung from lumen per watt to lumen per dollar. Cost reduction has become the main priority to fight off price erosion and also to drive market demand. Migration to larger substrate size is one of those approaches to reduce chip cost. Although leading LED chip makers are in mass production on 4" and 6" substrates, the industry is now moving towards 6" and 8" gallium nitride-on-silicon production. Investment in GaN-on-Si LEDs and trial production is occurring worldwide, with companies in Japan, Korea and China the most aggressive in pursuing this technology. Other cost-reduction efforts can be found on epitaxy and substrate processes and in packaging, i.e. wafer-level packaging (WLP) LEDs, flip-chip LEDs, and other technologies.

In terms of epitaxy/chip investment, SEMI's data shows that, after two years of recession, the investment level is stabilizing in 2014. China is the region showing the strongest new investment and capacity additions (driven by leading chip makers in both Taiwan and China). Metal-organic chemical vapor deposition (MOCVD) is still the key cost factor in the epitaxy process, but other equipment categories such as lithography, etch, test and inspection are gaining momentum as far as optimizing productivity in order to lower costs. LED investment is unlikely to return to the level of 2010/2011 spending, but improvement is expected in 2015 with the increasing adoption of solid-state lighting (SSL). ■

Migration to larger substrate size is one of those



approaches to reduce chip cost. Although leading LED chip makers are in mass production on 4" and 6" substrates, the industry is now moving towards 6" and 8" gallium nitride-on-silicon production. Investment in GaN-on-Si LEDs and trial production is occurring worldwide, with companies in Japan, Korea and China the most aggressive in pursuing this technology. Other cost-reduction efforts can be found on epitaxy and substrate processes and in packaging, i.e. wafer-level packaging (WLP) LEDs, flip-chip LEDs, and other technologies.

In terms of epitaxy/chip investment, SEMI's data shows that, after two years of recession, the investment level is stabilizing in 2014. China is the region showing the strongest new investment and capacity additions (driven by leading chip makers in both Taiwan and China). Metal-organic chemical vapor deposition (MOCVD) is still the key cost factor in the epitaxy process, but other equipment categories such as lithography, etch, test and inspection are gaining momentum as far as optimizing productivity in order to lower costs. LED investment is unlikely to return to the level of 2010/2011 spending, but improvement is expected in 2015 with the increasing adoption of solid-state lighting (SSL). ■

www.semi.org/en/Store/MarketInformation/OptoLEDFabForecast