

Strategies in Light®

The Leading Events for the Global LED and Lighting Industry

Rewind and Fast Forward

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Introduction/Disclosure

- The presenter has authored more than \$10b of funded investment plans for AMLCD factories.
- The presenter is biased. He believes that the snowball effect of AMLCD (TFT-LCD) investment will overrun most alternative display technologies for the rest of the 2010's.
- The LCD TV Association believes AMLCD will remain the dominant display technology for televisions in the 2010's.
- The presenter and the association believe that LED illumination (LED-lit) will replace CCFL illumination for side-light and back-light subsystems in AMLCD.
- This presentation uses public sources of information.

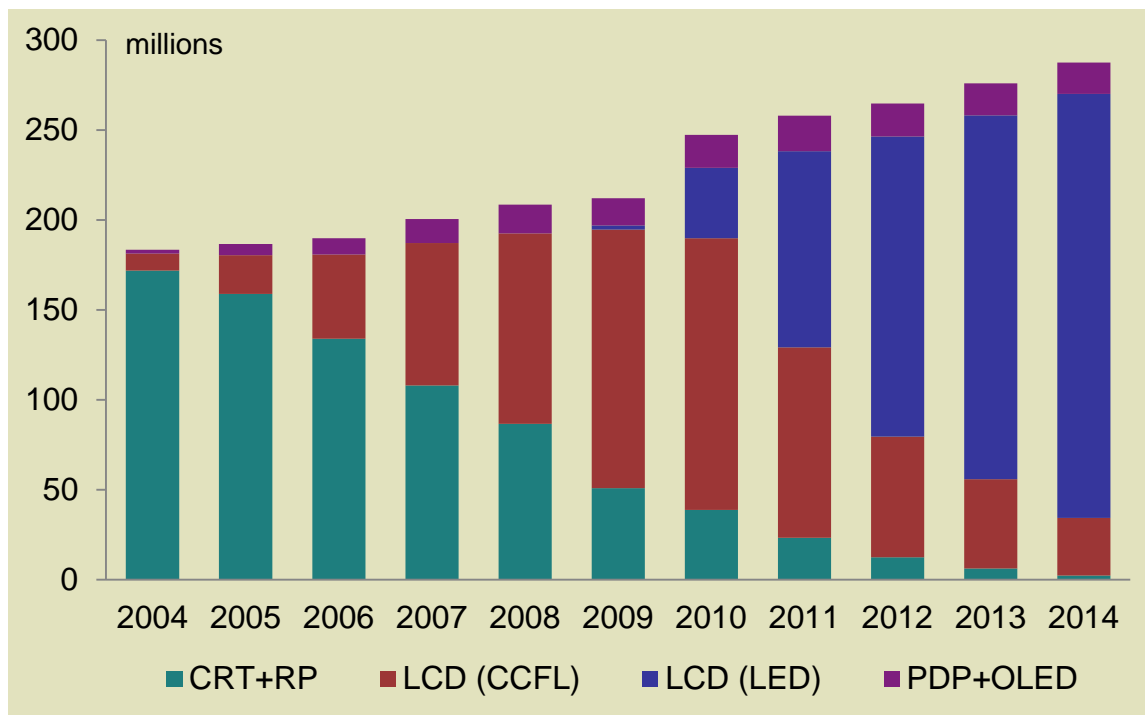
LED-lit LCD TV Will Lead the Market

LCD TV shipments grew 32% per annum from 2004 to 2009 and captured a 69% global share.

LED-lit LCD TV units may grow 59% per year 2009–2014 and capture a 82% global share of TV sets.

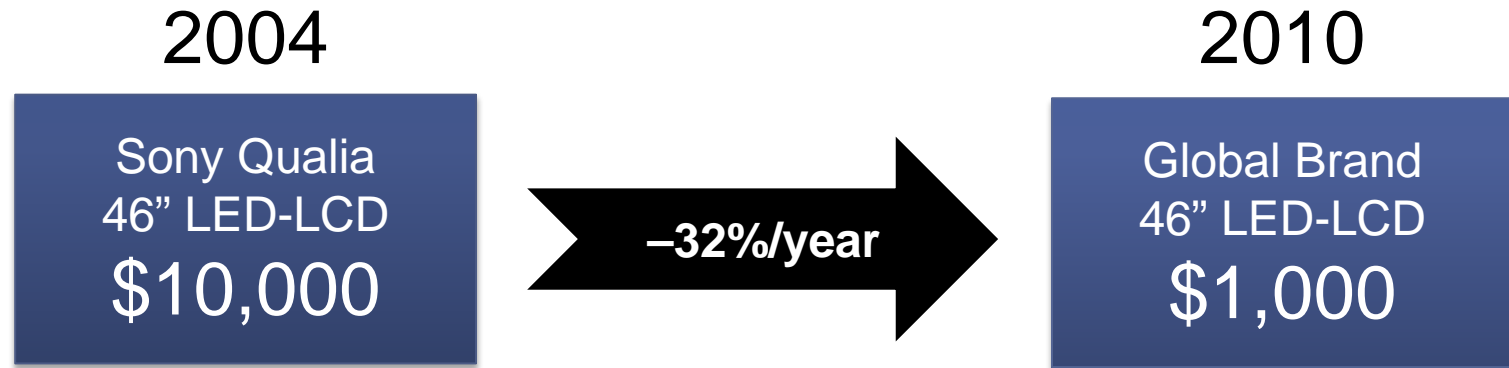
LED were in 21% of LCD TV last year and may be in 51%, 2011.

TV Shipments by Technology



Millions of sets; DisplaySearch, Jan '11, BizWitz analysis

LED-lit TV Prices Follow Historical Trends



- The price of LED-lit LCD TV sets has fallen 32% per year ...only slightly faster than the pace for all LCD TV sets.
- The price of 32" LCD TV sets has been falling 19% a year ... matching the pace of AMLCD panel price decline.

LED-lit Costs Were Higher but Better

CCFL-lit 40/42" 1H'09*

CCFL 18% of Backlight
5% of LCD Module
1% of LCD TV
Vendors Harrison Toshiba
Stanley, et alii

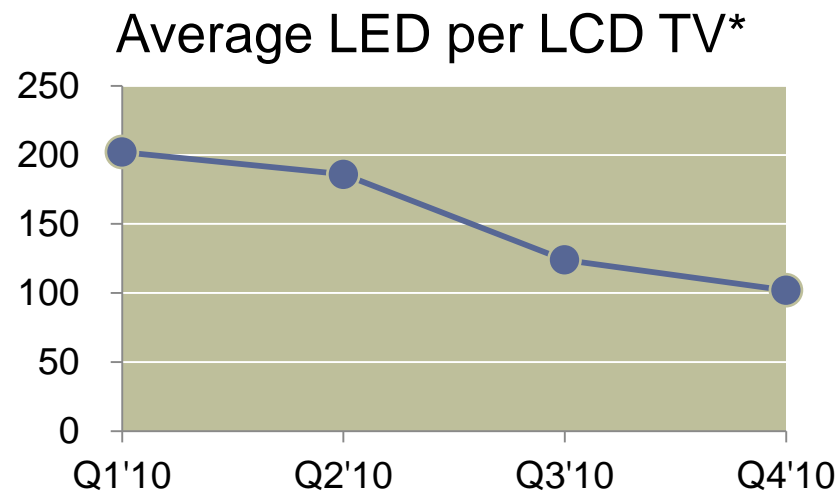
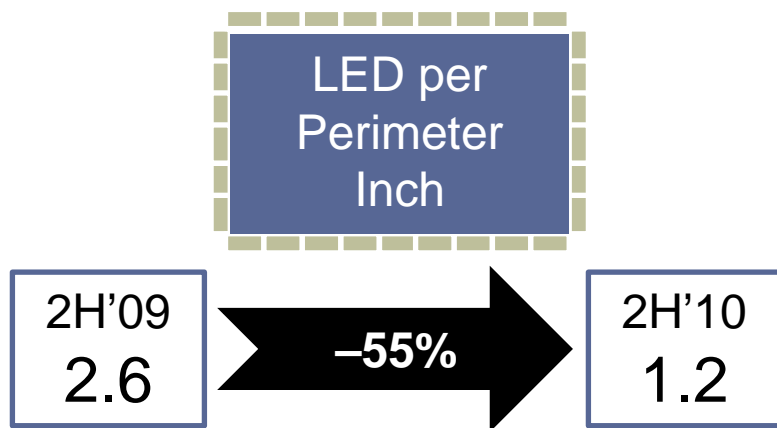
LED-lit 40/42" 1H'09*

LED 40% of Backlight
12% of LCD Module
3% of LCD TV
Vendors Samsung LED
LG Innotek, et alii

- Korean and Taiwanese producers inherited a Japanese business model: value to suppliers.
- As they move to China, they prefer a new model: value to themselves and their associates.

* DisplaySearch; BizWitz analysis

LED-lit Costs Will Be Lower



- Introduction of two-sided illumination portends continued cost savings and scale economies.
- LED cost will comprise a smaller portion of cost ...but the cost will be paid to affiliated suppliers.

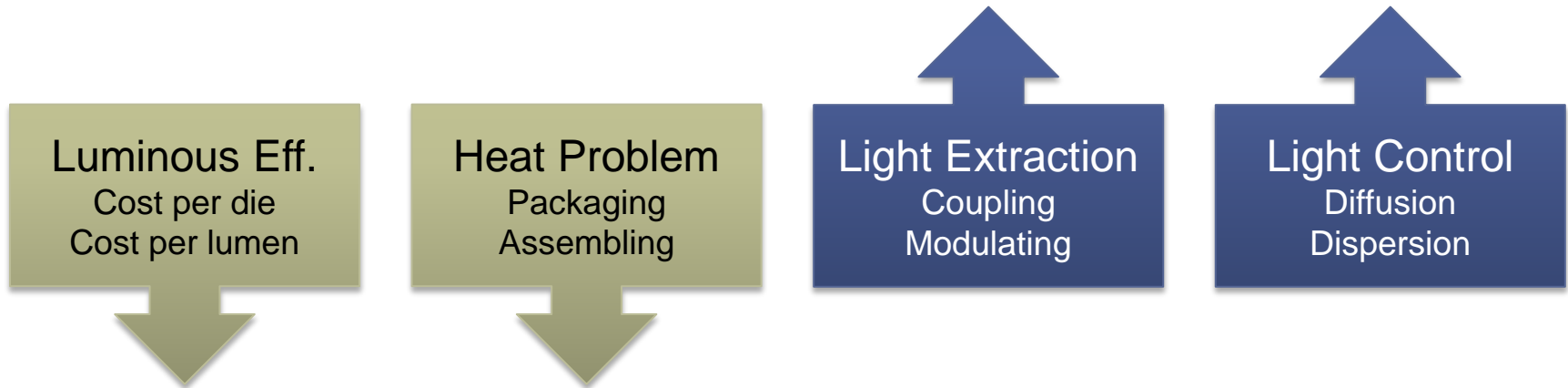
* IMS Research, BizWitz analysis; perimeter based on 40" TV

Rewind and Reshape the Value Chain

TV Brand	Panel Maker	LED Supplier	Related JV
Samsung	Samsung LCD	Samsung LED	Samsung Micro.
LG	LG Display	LG Innotek	Wooree
TPV (OEM) AOC	AU Optronics	Lextar	Everlight, Epistar
Hon Hai (OEM)	Chimei Innolux	Formosa Epitaxy	AOT, Chi Lin

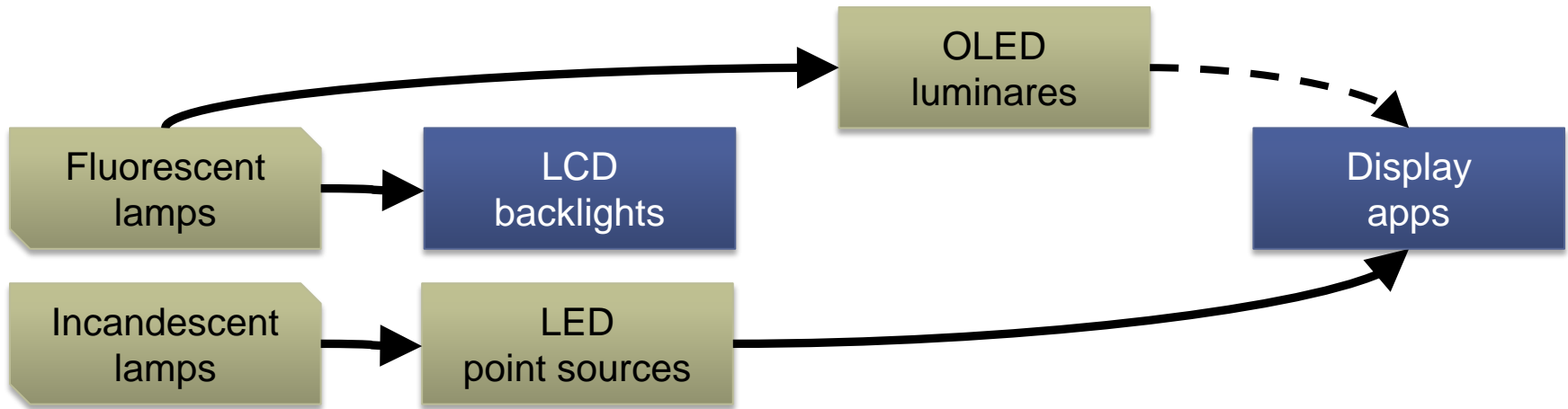
- Tablets and Televisions provide opportunities for brands and panel makers to capture more value.
- Former suppliers such as Harrison or SAES Getters lose customers and revenues.

Fast Forward to SSL



- LCD demand will not fill LED fabs after 2012.
- LCD experience prepares LED for SSL markets.
- OLEDreamers may wake up to find LED enables wonderful, flat luminaires such as backlights.

Summary: LED Play in Display



- Expected evolution from fluorescents to OLED luminaires remains uncertain, as does the mass market development of OLED TV sets.
- The evolution of LED to lights and display apps seems more certain.