

Asian Manufacturers Spur Low Priced Lighting Era

-2015 DOE SSL R&D Workshop-

Roger Chu

Director of LEDinside

28 Jan 2015

TAIPEI

SHENZHEN

SHANGHAI

BEIJING

About TrendForce

TrendForce is a global provider of market intelligence about the technology industry. Having served businesses for over a decade, the company has built up a strong membership base of 410,000 subscribers. TrendForce serves clients throughout the technology and financial service industries.

TrendForce has established a reputation as an organization that offers insightful and accurate analyses of the high tech sector through five major research divisions:

- **DRAMeXchange** focuses on memory, storage and the consumer electronics industry including PC DRAM, Mobile DRAM, Server DRAM, NAND Flash, SSD and smartphone.
- **WitsView** offers comprehensive coverage of the display industry from upstream components, midstream panels/touch modules to downstream system integrators, brands and channels.
- **LEDinside** covers all aspects of the LED supply chain from upstream equipment/materials, midstream chip/packaging to the downstream backlight and lighting market.
- **EnergyTrend** specializes in green energy research, such as solar energy, lithium batteries, energy storage systems and xEVs.
- **Avanti** is a research organization with a focus on consumer behavior in China.
- **Topology** studies structural trends of technology industries in the Greater China Region and beyond, focusing on semiconductors, photovoltaic technology, telecommunications, and IA.



Overview of LEDinside's Business

- Branches: Taipei ,Shenzhen,Shanghai
- Staff: Around 250 Employees
- Vertical Industry Service Provider

Market Research

Media

B2B

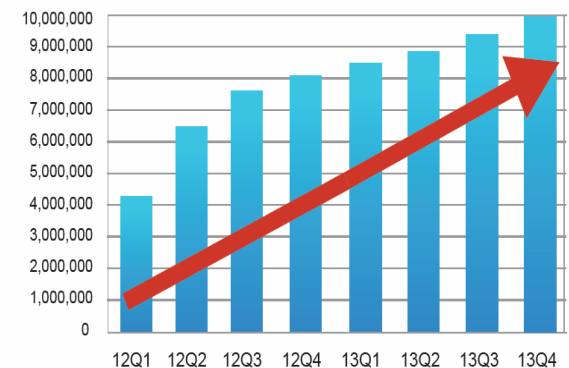
Shanghai

Taipei

Shenzhen



Monthly page views



Outline

1) Market Outlook & Perspective

- From LED to LED Lighting

2) LED Technology Development

- Trend to Cost Reduction

3) Emergence of Low Priced Lighting Era

- Rise of Asian Manufacturers

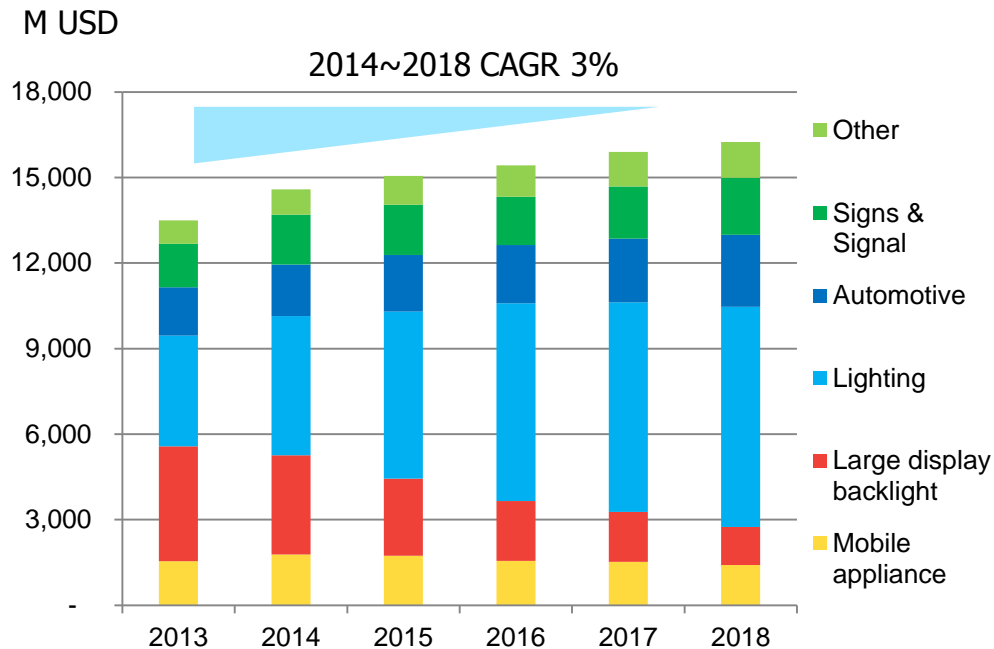
4) Conclusion

- Risks and Opportunities in the Mature Industry

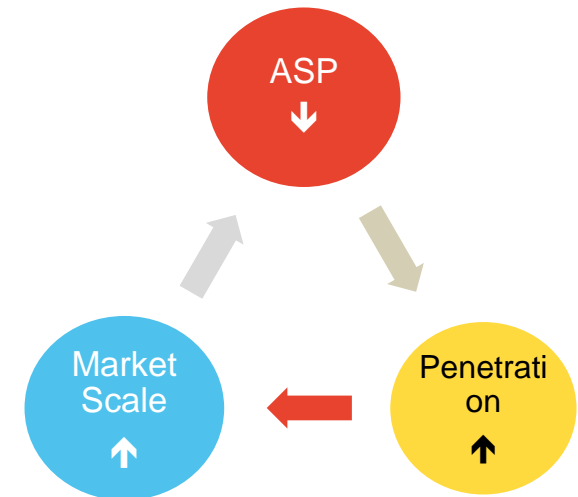


2014-2018 Global HB LED Market Forecast

HB LED Market Forecast (2013~2018)



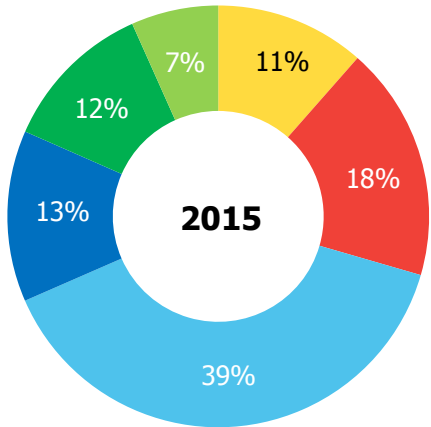
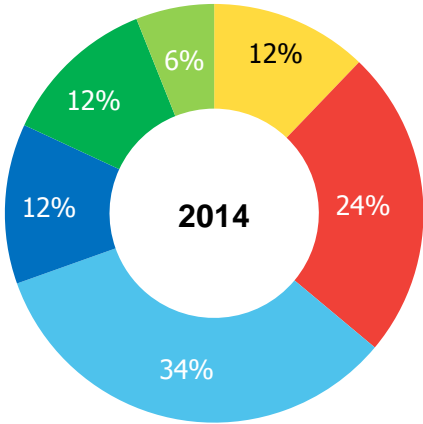
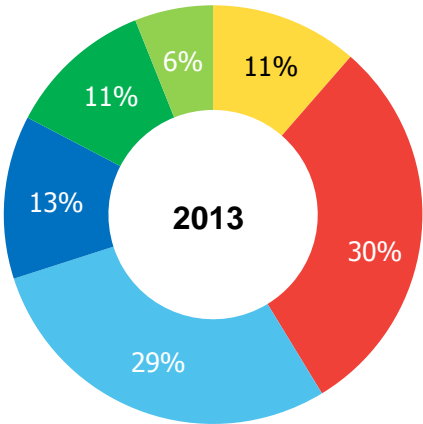
Lighting Keeps To Grow Up



- The global high brightness LED market size is projected to reach US \$14.5 billion (YoY +8%) in 2014. LEDinside estimates the LED market is expected to reach US \$16.2 billion in 2018, and will grow at a CAGR of 3% from 2014-2018.

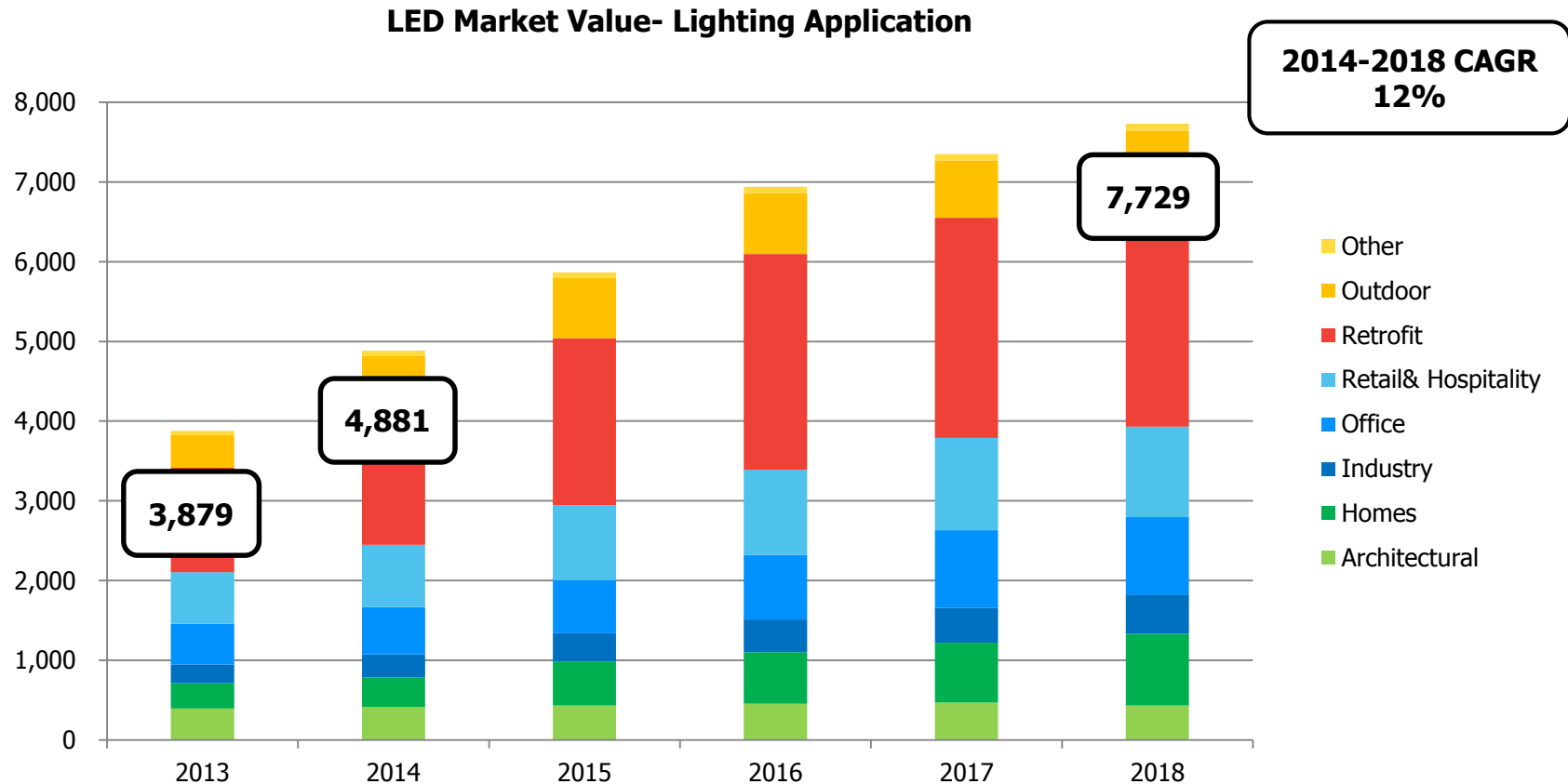
Lighting Market Demand on the Rise to Surpass the Demand From Large Sized Backlight and Handheld Device Applications

- Lighting
- Automotive
- Other
- Signs & Signal
- Mobile appliance
- Large display backlight



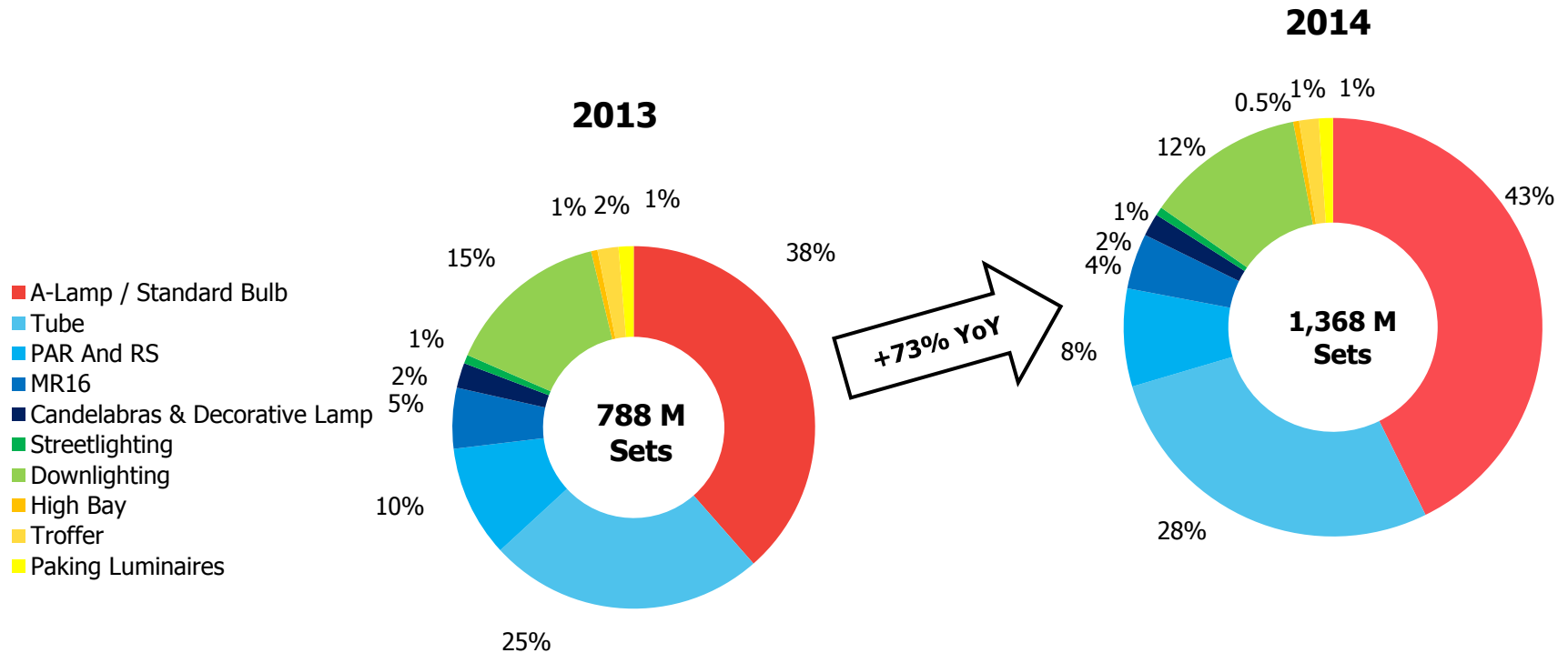
Lighting ↑
Backlight ↓

LED Lighting Still at High Growth Phase in 2014~2018



- Observed from LED lighting market, the LED package market value for lighting applications will soar in 2014, especially for replacement products. Followed by significant growth in industrial, commercial, and outdoor lighting markets.

2013~2014 Global LED Lighting Fixtures Demand Rapidly Growing

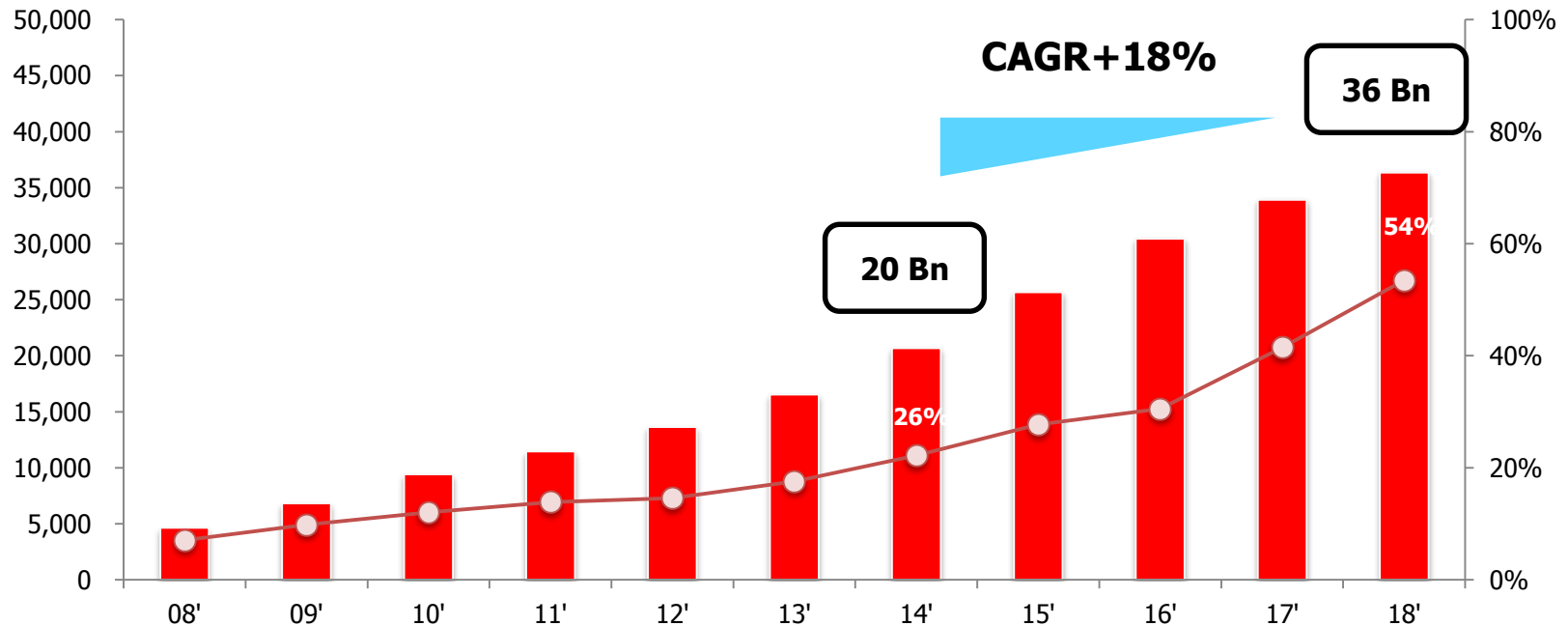


- Total LED lighting product shipment volume continues to grow substantially in 2014, especially, more and more lighting brands aggressively promote LED bulbs and LED tubes.

The Global LED Lighting Market Scale is Gradually Increasing

M USD

Global LED Lighting Scale & Penetration Rate



- LEDinside estimates the global LED lighting market scale will continue to grow, from a market size of US \$4.5 billion in 2008 to US \$36 billion in 2018. LED lighting market penetration rates are expected to reach 54%.

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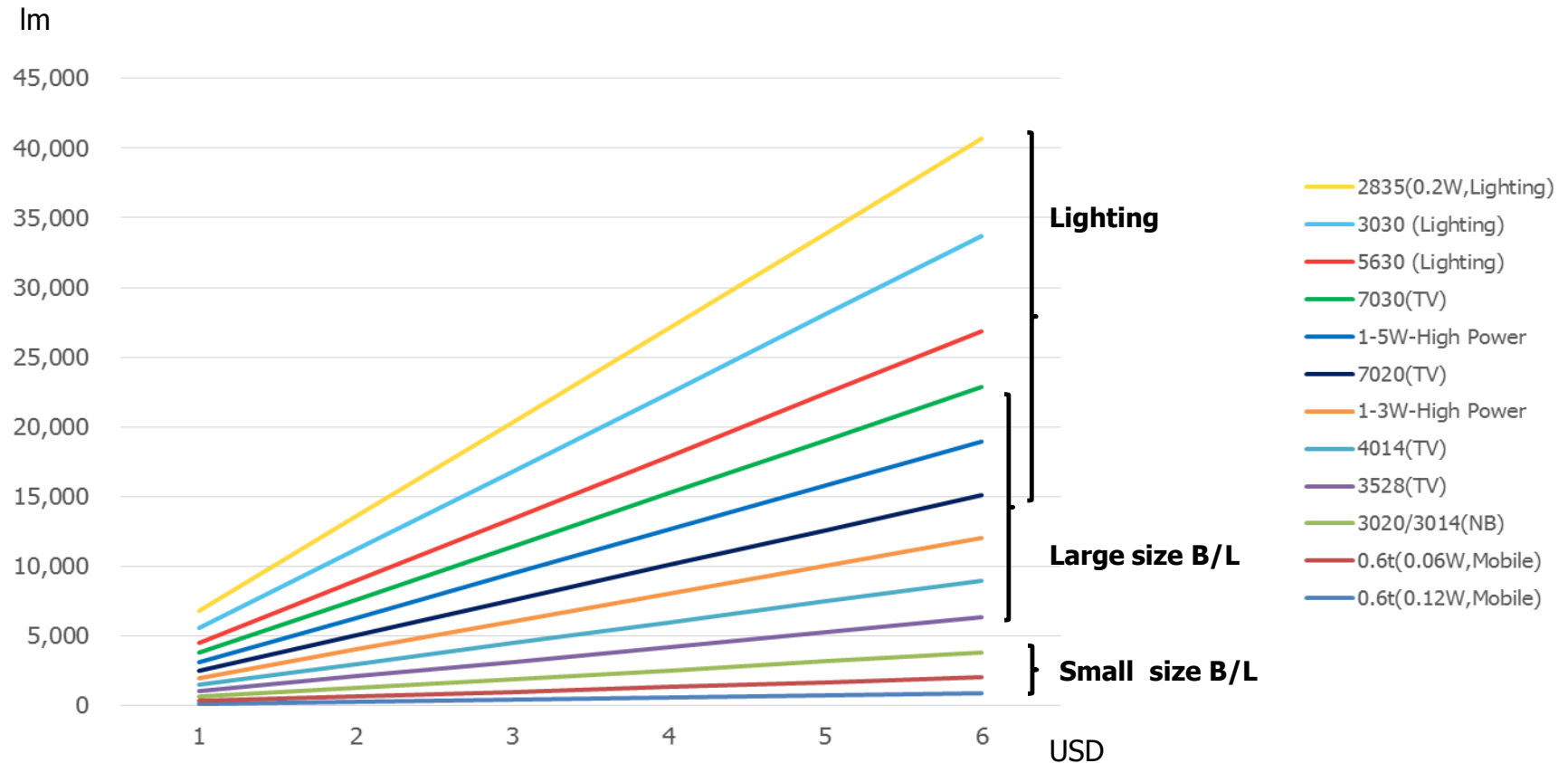
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Price Elasticity in Product Applications: lm/\$

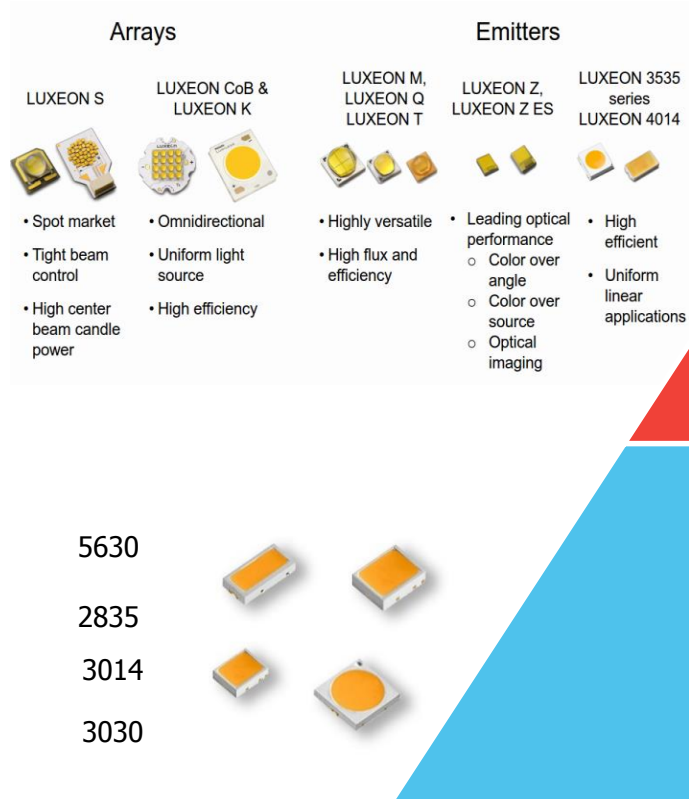


- Observations from lm/\$ performance show, we can know how much lumens customers get from every dollar paid.

Different Requirements in Different Lighting Segments

Solutions

Requirements



High End

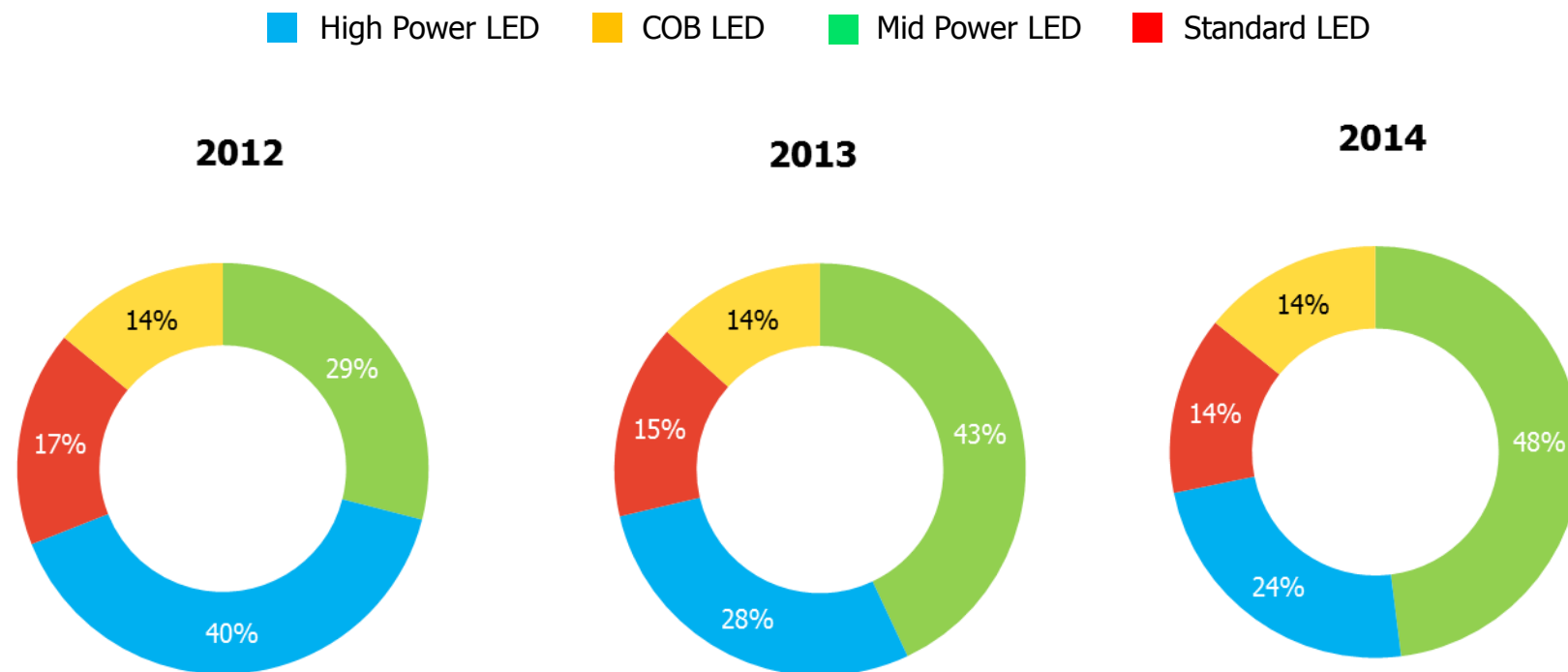
Middle End

Low End

Light Quality
Form Factor
Color Tunable
Efficiency
Reliability

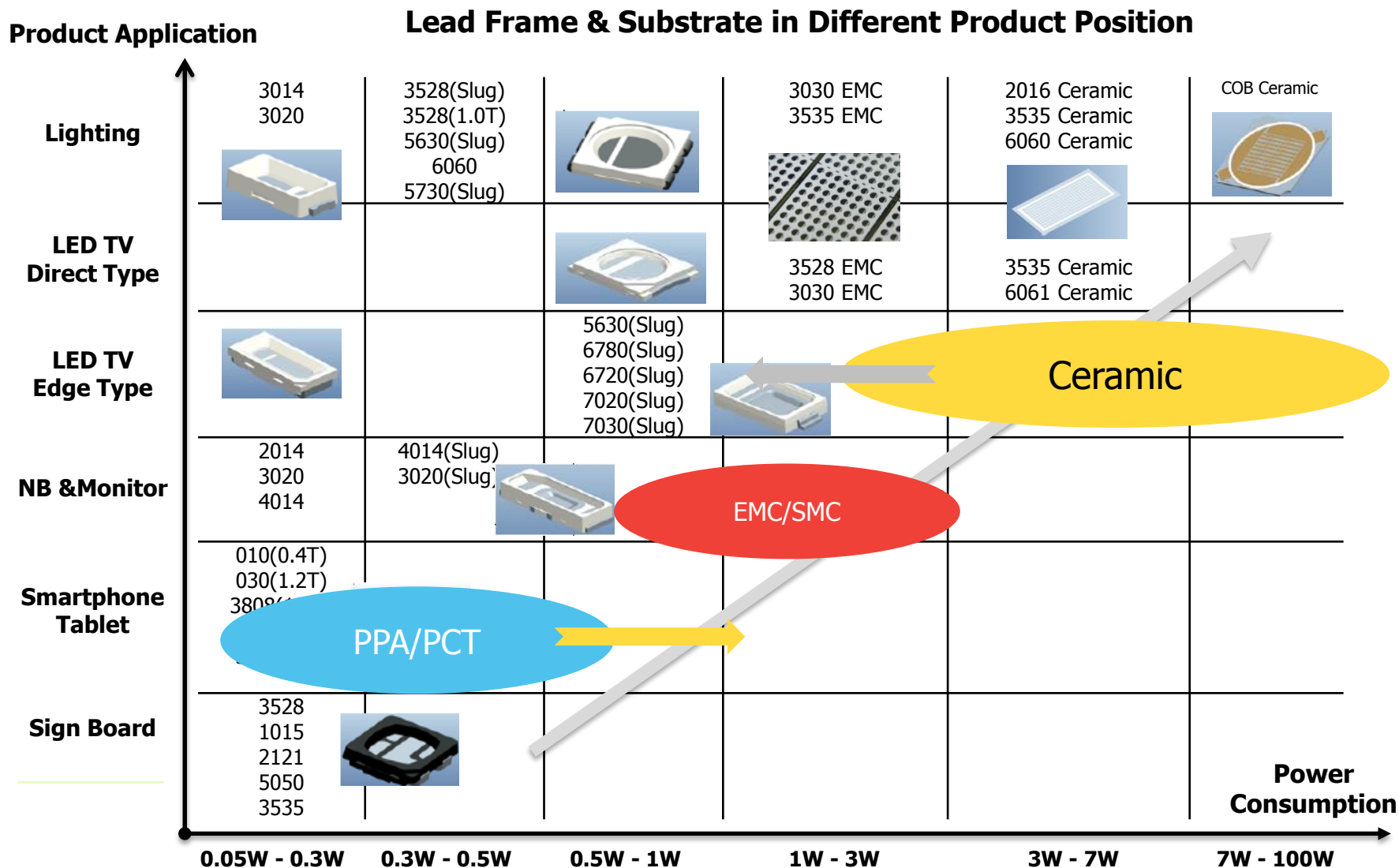
Cost!
Cost!
Cost!

Standard & Mid Power LEDs Become Mainstream in Lighting Market



- **Mid-power LEDs** including 5630, 3030, and 2835 LEDs will become mainstream on the market. LEDinside projects mid-power LEDs to have a 48% share in the lighting-use LED market value for 2014.

C/P Ratio Becomes Key To Success With Tech Advancements



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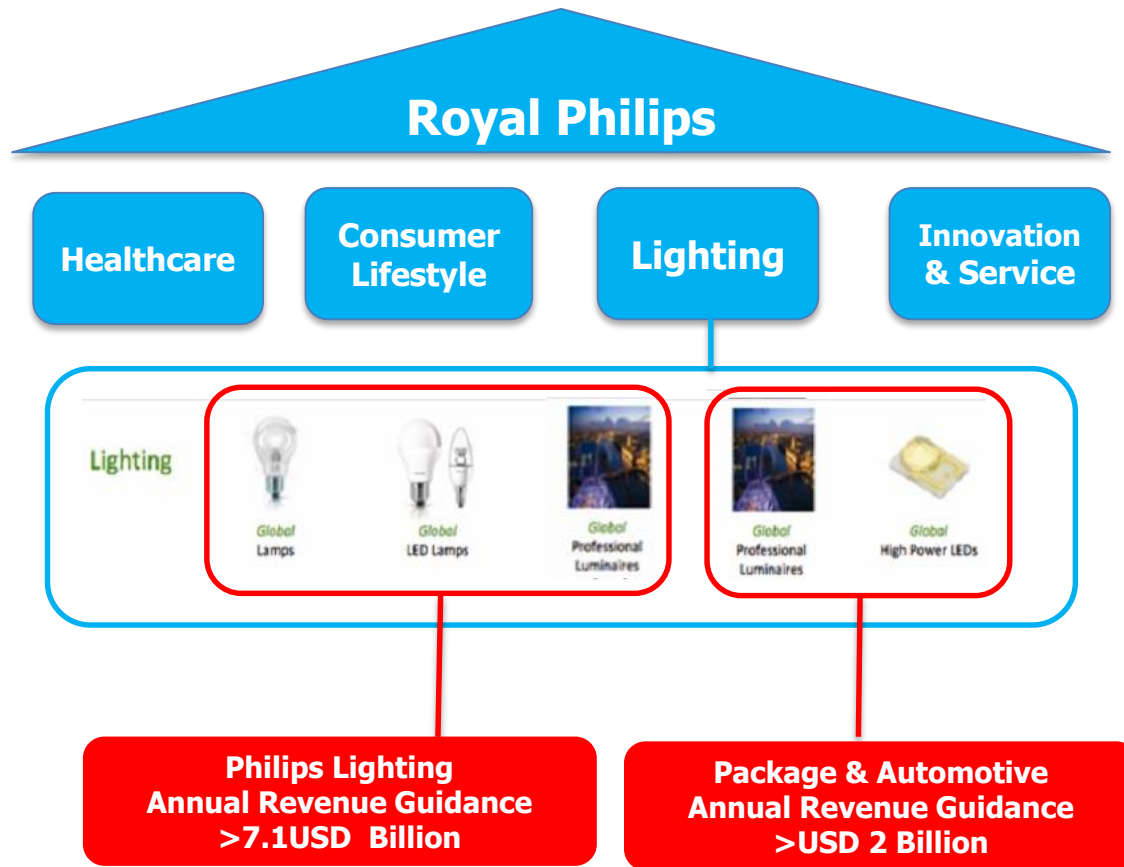
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What's The Impact From Chinese Low Price Strategy

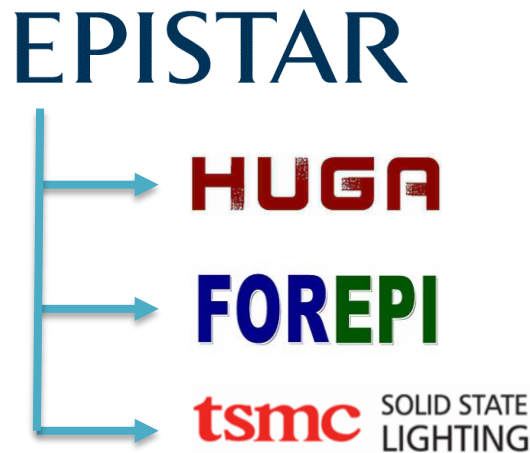
Philips Lighting Business Restructures to Face the Challenge



The rise of Asian lighting producers has brought intense competition, and traditional lighting firms such as Philips and OSRAM have started to plot new strategies to correspond to the change.

Confronted By the Rise of China, Taiwan LED Companies to Cope With Industry Changes through Acquisitions and Alliances

Horizontal Integration



Vertical Integration



Strategic Alliance

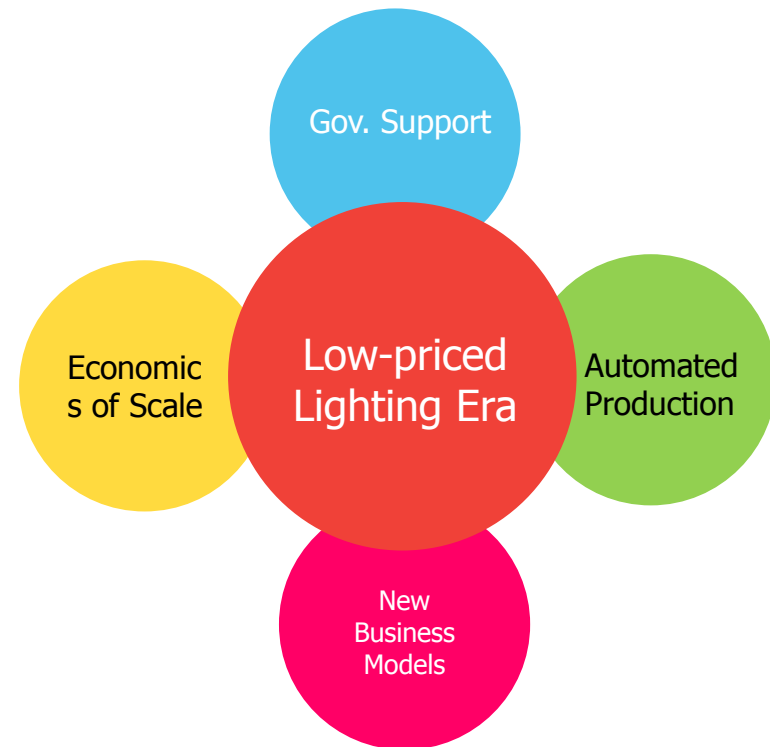


Because LED industry is suffering from oversupply issues, LED companies continue to go out of business and being merged. Take Epistar for example, it copes with industry changes through horizontal integration. Everlight also finds more opportunities by acquiring downstream lighting manufacturers. On the other hand, CREE has become a shareholder of Lextar, a LED manufacturer, hoping to reduce costs through strategic alliance.

Low-Priced Lighting Era

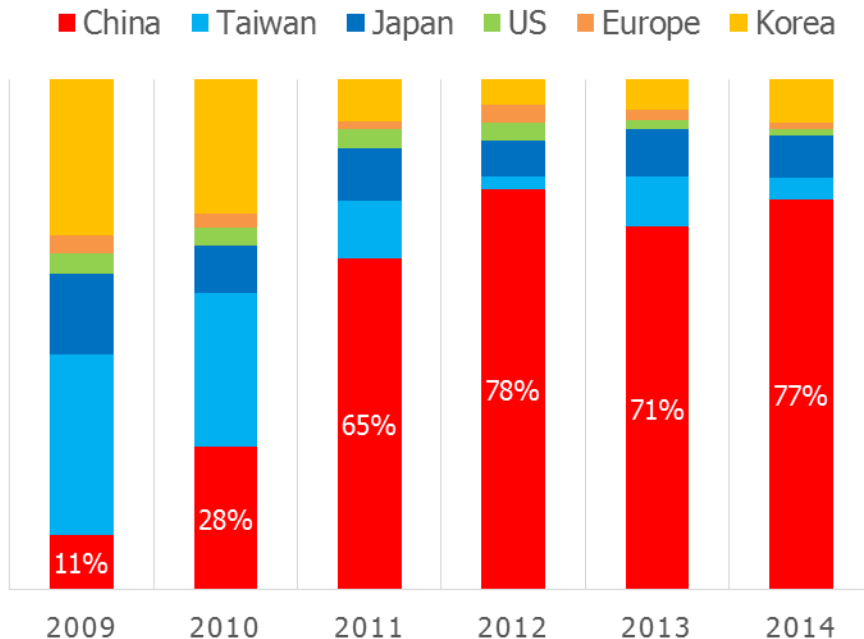
Manufacturers Turn to All Sorts of Methods to Lower Costs

Lighting manufacturers are implementing various low-pricing strategies to meet market demands, as competition intensifies and the industry enters low-pricing era.



Chinese Subsidies Lead to Higher MOCVD Installation in China Compare to Other Regions

Global New MOCVD Installation By Region



Top 5 LED Chip Manufacturers with the Largest MOCVD Expansions

2014	2015(F)
HC Semitek	Sanan Opto
Sanan Opto	Changelight
Changelight	Kaistar
Aucksun	HC Semitek
Nanojoin	Tongfang

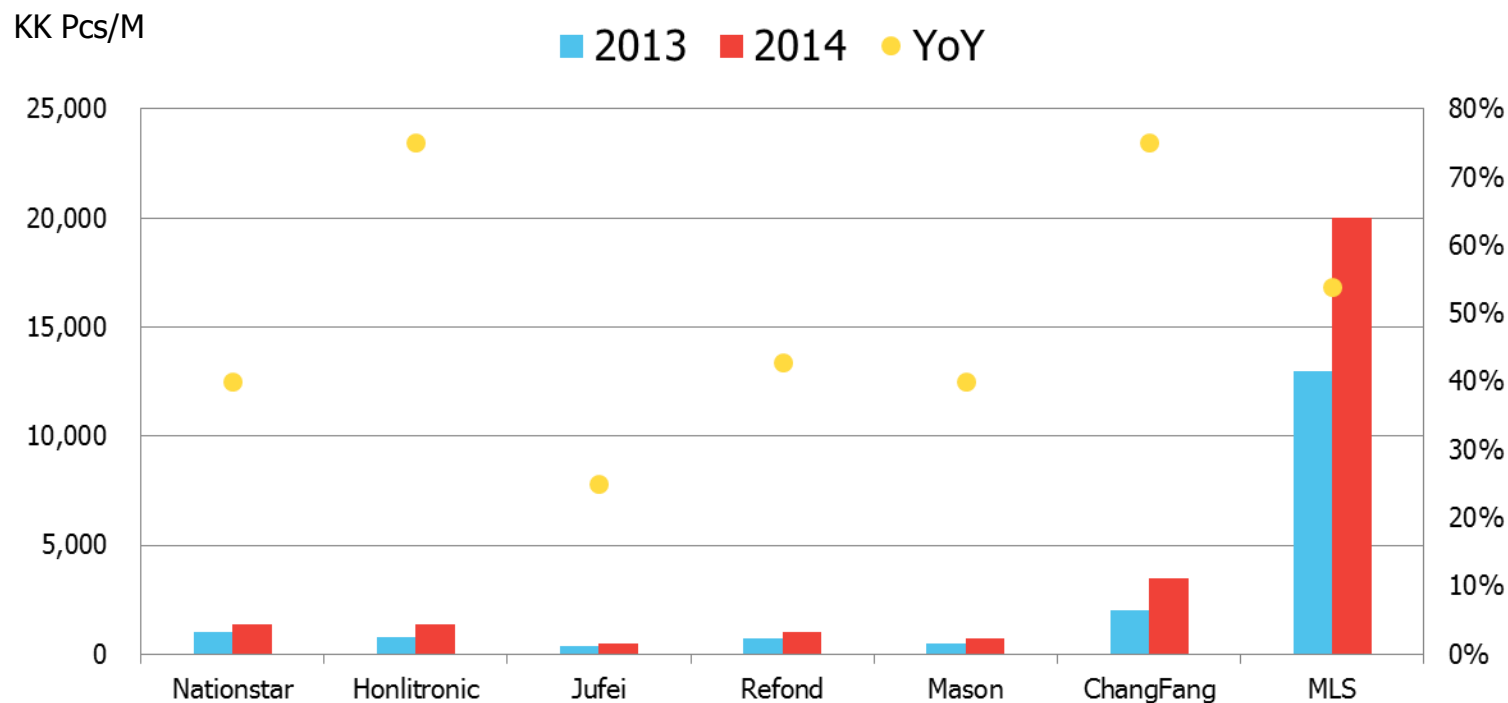
- After Chinese local governments decided to subsidize Chinese LED chips since 2010, the MOCVD installation in China has been higher than other regions. Through the upstream subsidies, China can have high cost competitiveness when manufacturing LED.

MOCVD Remained as the Main Subsidy Target

2013 (Million USD)	Sanan	ETI	Nationstar	Refond
Sales Revenue	601.95	504.82	184.25	110.00
Total Subsidies	33.86	37.42	6.47	1.84
- MOCVD	30.62	9.02	X	X
- Other (e.g. buildings)	-	28.40	6.47	1.84
Other Support (e.g. higher sales prices, Government Project..)	Project Support	Project Support		

- Subsidy provided by China local authorities accounted for around 3-5% of the companies' revenue in general and MOCVD remained as the main subsidy target.
- San'an Opto recorded RMB 196 million (US \$31 million) subsidy for 1H14, and total subsidy for 2014 is expected to double the growth of the previous year. Hence, San'an Opto will plan for large scale capacity expansion during 2014-2015.

China Package Manufacturers Actively Expanding to Reach Economies of Scale

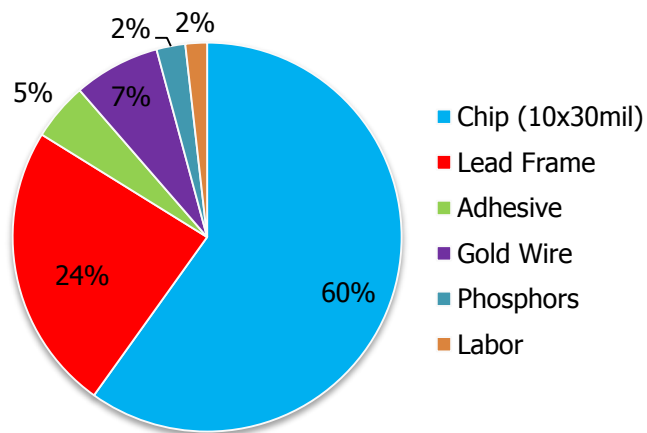


- The major strength of China package manufacturers still rely on cost competitiveness, where manufacturers actively expand their capacity to produce standardized products, and ultimately achieving economies of scale.
- Tier-one Chinese LED package manufacturers' capacity grew 40-50% in 2014. Chinese manufacturers' capacity is close at Taiwanese manufacturers' heels.

Chinese Package Manufacturers Raise 2835 Strength Through Standardization and Domestic Production

Standardization

2835 BOM Cost Analysis



Domestic Production

LED Chip

Sanan Opto, ETI ,
HC SemiTek, Epitop...

Lead Frame

Chongia, Everwin,
Dongxu Metal....

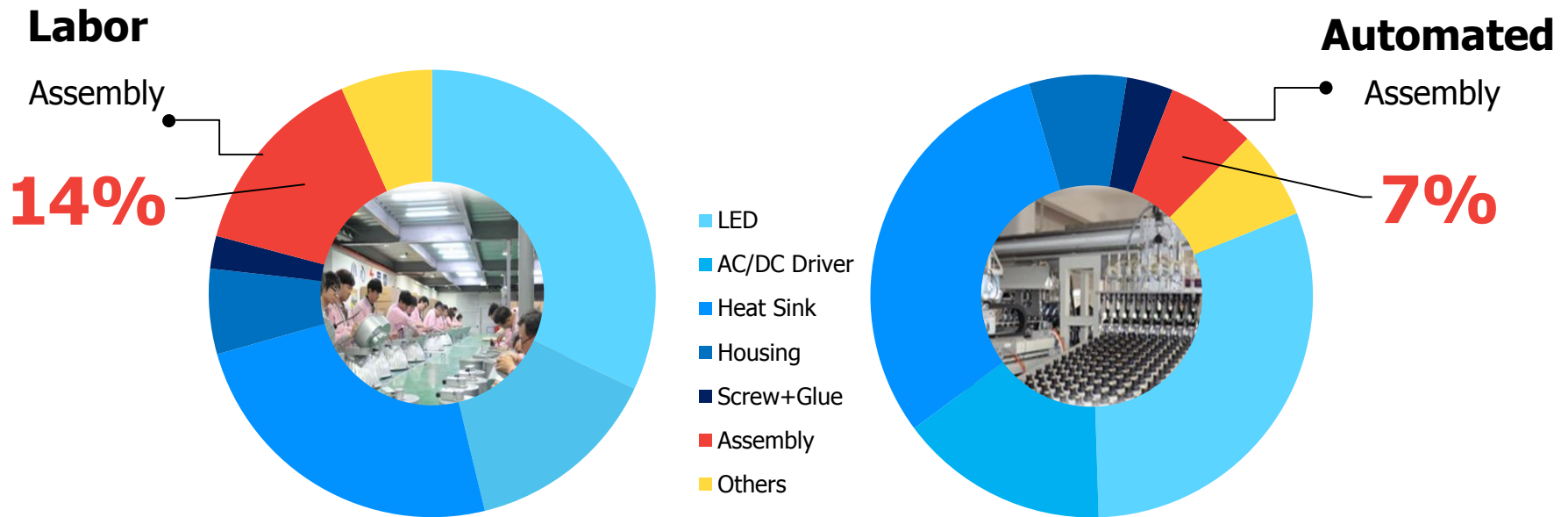
Phosphor

Grirem Advanced
Material, Bree Optronics...

- Chinese package manufacturers 2835 LEDs are very cheap, mainly because of economics of scale achieved by standardization. Therefore, pricing has been very competitive.

Automated Production Lines Sufficiently Lower LED Bulb BOM Cost

40W Equiv. LED Lamp BOM Cost



- Take LED bulbs for example, 40 equiv. LED bulbs Labor costs were halved by introducing automated production lines, and production volume is estimated to be above 10-15 million bulbs to be economically beneficial.

What Can you Buy with **RMB 11?**

It is Not Enough to Buy Fast Food in Shenzhen, China

DARK ENERGY 暗能量

联盟第一季: LED T8玻璃灯管

L1200mm

高亮度、高显指、长寿命

¥11.00

第二集、第三集、第四集.....第七集

惊喜连连, 敬请期待!!!

LED Package



Aluminum Capacitors



MB6S



Driver IC 晶丰明源

Transistor



Ceramic Capacitors



Glass Tube



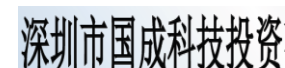
LED Driver



Brand & Channel



Capital



SMT



- A 1.2 m LED tube's FOB price costs a mere RMB 11. Twenty-three manufacturers from different industries have established a LED Lighting Strategic Alliance to develop cheap LED lighting products. These manufacturers are sharing the same market resources to quickly develop lighting products, while lowering material prices and production costs reasonably.

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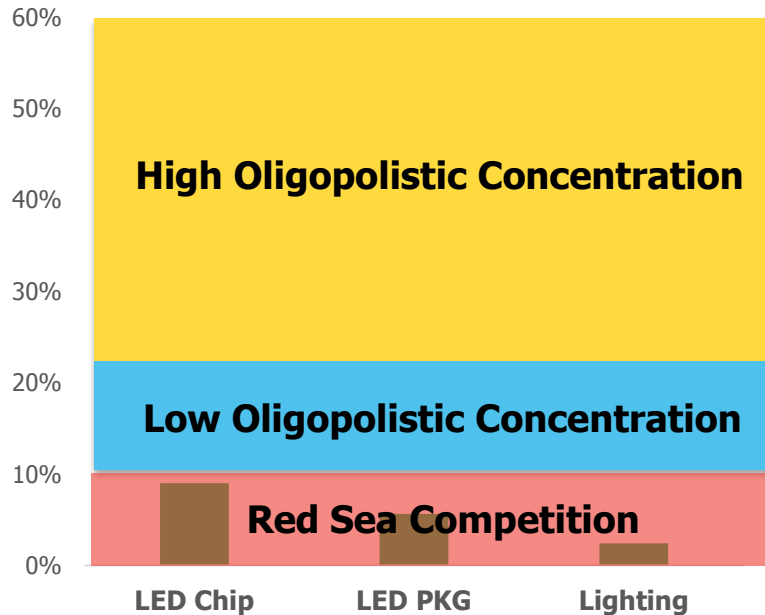
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Low Entrance Threshold Leads to Chaotic Condition in LED Industry

HHI Index



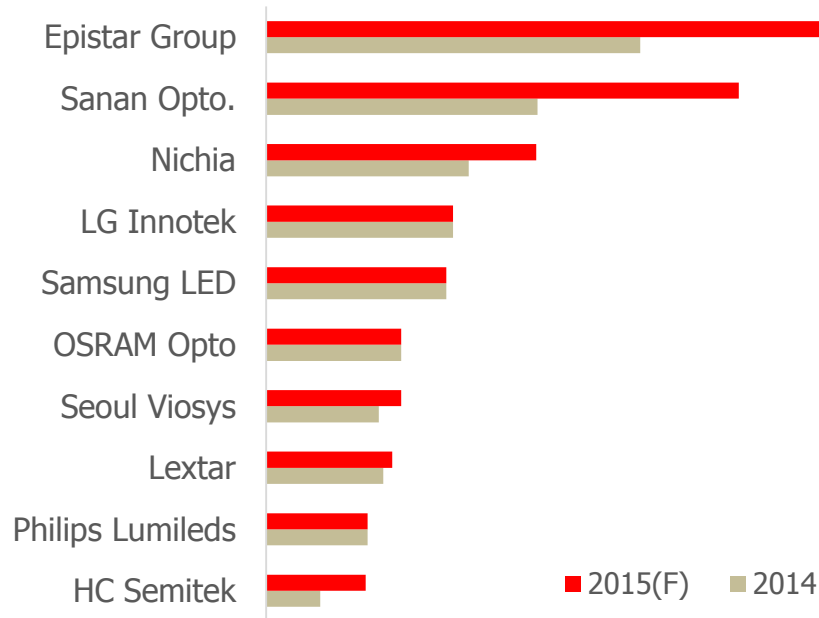
Four Market Structure and Its Corresponding Price Competition

Type of Competition	Herfindahl Index Range	Intensity of Price Competition
Competition	< 10%	Intense
Low Oligopolistic Concentration	10~18%	May be intense or low, depends on product differentiation
High Oligopolistic Concentration	18%~60%	May be intense or low, depends on competition among companies
Monopoly	≥60%	Usually low, unless there is threat

The Herfindahl–Hirschman Index(HHI) is a measure of the size of firms in relation to the industry and an indicator of the amount of competition among them. It is defined as the sum of the squares of the market shares of the 50 largest firms within the industry, where the market shares are expressed as fractions. The result is proportional to the average market share, weighted by market share.

The Industry Will be Concentrated as Tier-Two Competitors Begin to be Eliminated after The Market Matures

Chip House's Wafer Capacity Estimates



Taiwan:

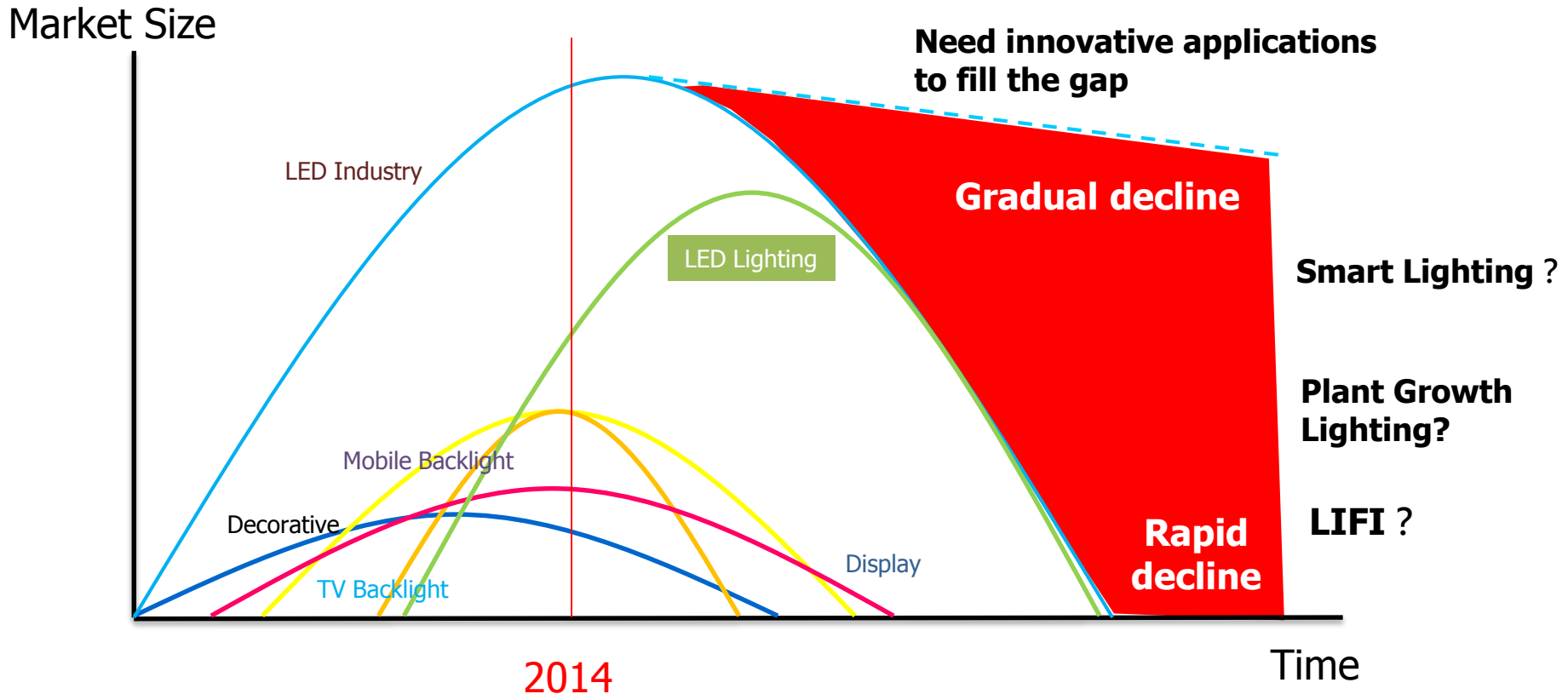
- **Epistar group** recorded monthly TIE capacity reached 850K pcs in 2014. Total production capacity is expected to exceed 1,200K pcs/month in 2015 after merge with FOREPI.

China:

- **San'an Opto** recorded 600k monthly capacity in 2H14, which will reach 1,000k/month by 2H15, nearing rival Epistar's production capacity.
- **HC Semitek** has two wafer manufacturing bases located in Wuhan and Suzhou. The TIE capacity will reach 200k/month by 2015.

While tier-one LED manufacturers continue to work on capacity expansion, price reduction remains in the LED industry. Soon, tier-two manufacturers will be eliminated from the market follow this trend. Profits in the overall industry will also increase as the industrial concentration becomes more obvious.

Industry Maturity: What is The Next Innovative Application?



- Entrepreneurs should take LED innovation cycle into consideration to push the industry onto the next level.
- If the industry recession becomes a reality, how to deal with the industry downturn, as well as how to manage the industry after the downturn.

Thank you!



www.ledinside.com

儲于超 Roger Chu,

Research Director of LEDinside,

TrendForce

RogerChu@TrendForce.com

