

Overview of the Data and Development of Solid State Lighting Industry in China in 2014

Provided by ISA Member: China Solid State Lighting Alliance (CSA)

December 2014

Highlights

- I. Good overall growth momentum and continuous improvement of prosperity index
- II. Technical progress exceeds expectation and new techniques lead the market
- III. Performance of the listed companies is outstanding and profits are improving
- IV. The market is comprehensively started and the price is reduced to the acceptable point
- V. Active investment and integration, resources further concentrated
- VI. Rapid export growth and the emerging market rises
- VII. 2015 industry development forecast

Overview of the Data and Development of Solid State Lighting Industry in China in 2014

Provided by ISA Member: China Solid State Lighting Alliance (CSA)

In 2014, Nobel Prize in Physics was awarded jointly to three scientists for their invention of the efficient blue light-emitting diode (LED) which has enabled bright and energy-saving white light sources. This award helps promoting the Solid State Lighting to the public view, and also shows the acceptance of the value of Solid State Lighting industry. In 2014, the global movement of “Phasing out the incandescent lamps” entered the second phase, with the favorable macroeconomic policies environment, the Solid State Lighting industry is embracing a golden period of development.

In 2014, the Solid State Lighting industry in China has transformed from technology-driven to application-driven, showed robust growth trend, and steady growth of the industrial scale. The innovative application is catching up with international innovation level. Leading enterprises and listed companies received impressive performances, many mergers and acquisitions happened, the industry dynamic is changing fast. The companies are making efforts on distribution channels, and the brand competition pattern is emerging. The competition became fiercer, causing some production reduction and bankruptcies. However, the overall Solid State Lighting industry in China is still booming and the prosperity index is improving.

I. Good overall growth momentum and continuous improvement of prosperity index

In 2014, the overall scale of Solid State Lighting industry in China reached 350.7 billion yuan, which is increased by 36% compared with 257.6 billion yuan in 2013. The high growth rate is maintained. Where, the upstream epitaxial wafer & chip scale is about 13.8 billion yuan, the midstream packaging scale is about 51.7 billion yuan, and the downstream application scale has increased to 285.2 billion yuan.

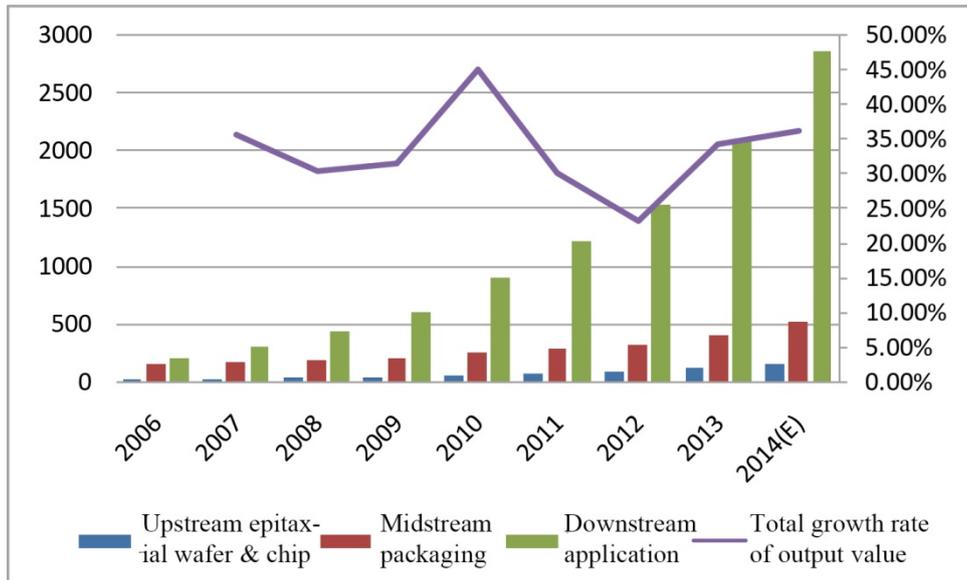


Figure 1 Industrial scale of various segments of semiconductor lighting industry in China 2014

(Source: CSA)

1. Robust upstream growth and the enhanced industrial concentration

The inventory of MOCVD equipment in China exceeds 1,290 sets in 2014, increased about 200 sets compared with 1,090 sets in 2013. In the aspect of equipment quantity, MOCVD equipments are further converged to the large enterprises. The installed equipment quantity of about 11% enterprises exceeds 50 sets; the installed equipment quantity of 45% enterprises is between 10 and 20 sets; and the installed equipment quantity of the rest 44% enterprises is less than 10 sets. The scale benefit of the enterprise with less equipment is in a relatively disadvantageous situation.

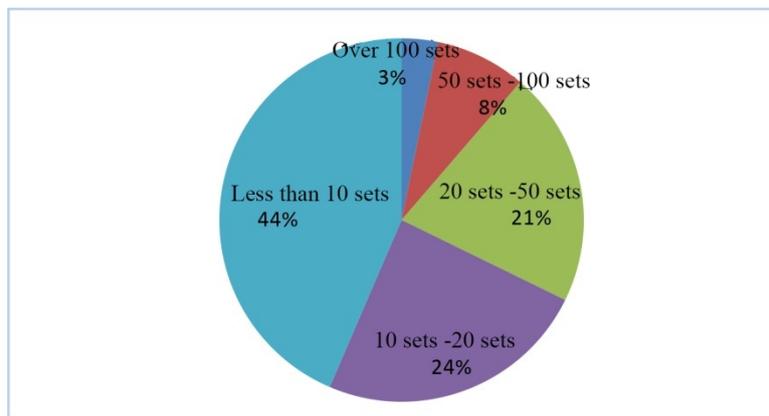


Figure 2 Distribution of MOCVD equipment inventory in China 2014

(Source: CSA)

In 2014, the output value in the segment of epitaxial chips in China is about 13.8 billion yuan, which is increased by 31% compared with that in 2013. Since the capacity utilization rate of the most enterprises has been remarkably improved, with the production capacity of the enterprises with expanded production in the earlier stage has been released continuously, the production capacity is increased by 69%, which is much higher than the output increase. The proportion of GaN chip output is up to 60%; the proportion of output of quaternary chips, mainly InGaAlP chip is about 28%; and the proportion of GaAs and other chips is about 12%. By means of good current expansion and light extraction efficiency characteristics, the flip chip is approved in the market, and the output is in rapid growth.

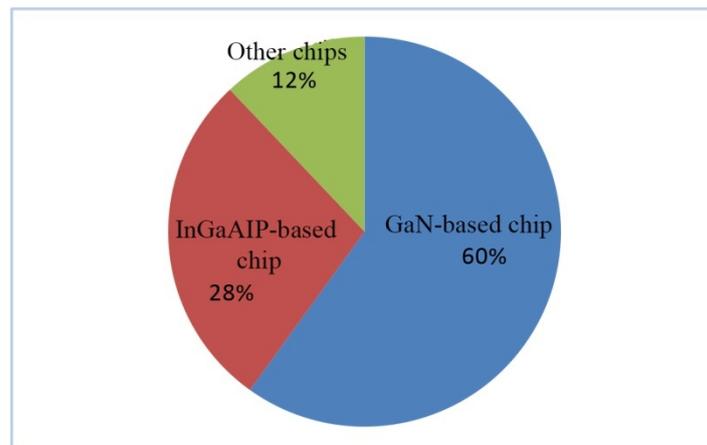


Figure 3 Structure of chip products in China 2014

(Source: CSA)

2. Stable midstream development and the mid-power package becomes the mainstream

In 2014, the development in LED package segment in China has been stable; with the output value reached 51.7 billion yuan, which has been increased by 28% compared with 2013. In the aspect of product specifications, 2835, 3030, 5630 and other 0.2-1W medium-power LED packages become the mainstream application in the market, which have been used by over 70% of the light sources such as the tubing lamp, bulb lamp, panel lamp, flush mounted ceiling lamp, ceiling lamp and other medium- and small-power lighting fixtures. The packaging enterprises have changed from focusing on the high power package to the medium-power package guided by the application demands. The proportion of medium-power apparatus is increased, exceeding 55% in 2014. The proportion of high-power package is less than 15%. The rest are the small-power packages with less than 0.2W.

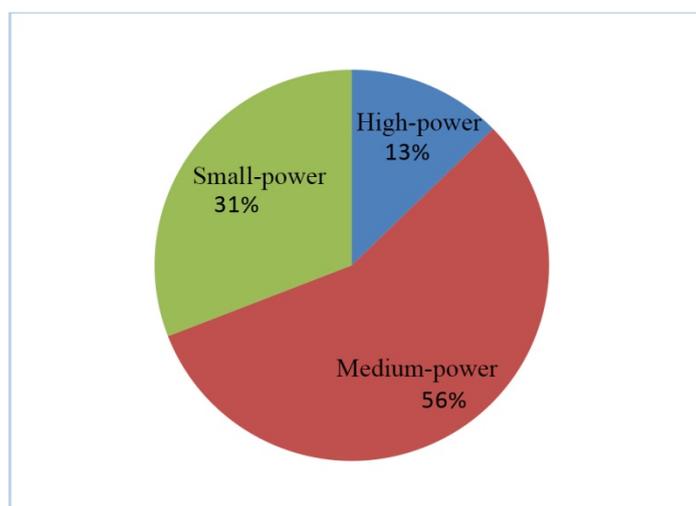


Figure 4 Proportions of products of different powers of LED packaged device in China 2014

(Source: CSA)

3. Explosive growth of downstream application and acceleration of general lighting penetration

In 2014, the industry scale of the SSL application in China reaches 285.2 billion yuan. Although it is subject to influence of continuously decreased price, it is still the segment with the rapidest growth in the industrial chain, and the overall growth rate of SSL application is nearly 38%. The general lighting market breaks out on a full scale, which growth rate is about 68%, with the output value up to 117.1 billion yuan. And the proportion in the SSL application market is increased from 34% in 2013 to 41% in 2014.

In 2014, the shipments of smart phone, Tablet PC and large-size TV are continuously increased. The increase in LED backlight application is mild, which annual growth rate is about 20%, with the output value up to 46.8 billion yuan. With the maturity of small spacing LED display technology and progressive cost reduction, LED display application also has rapid growth in 2014, which annual growth rate is about 35%, with the output value about 32.4 billion yuan.

In addition, the application of LED automotive lighting, medical treatment, agriculture and other emerging fields are expanded. And the applications of Smart lighting, optical communication and wearable electronics have become the new highlights of LED application in 2014.

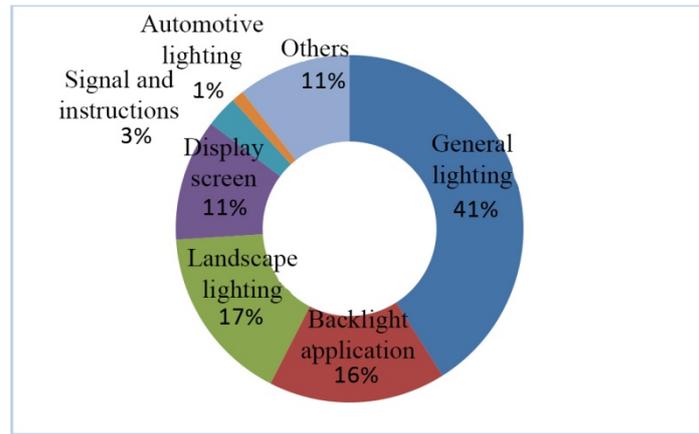


Figure 5 Distribution of semiconductor lighting application fields in China 2014

(Source: CSA)

II. Technical progress exceeds expectation and new techniques lead the market

China is catching up with the international level in terms of key technologies of Solid State Lighting. In 2014, the efficacy of high-power white light LED has reached 160 lm/W at the lab level, and the industrial efficacy of white type power LED reached 140 lm/W. The industrial efficacy of the silicon-substrate power LED chip reached 140 lm/W. The breakthrough of NPSS wafer high-quality AlN and deep UV LED has been made. The light-emitting wave length of deep UV LED is 293 nm, and the output power is over 4mW at the 20 mA current. The efficacy of OLED luminaires reaches 97 lm/W, and the service life exceeds 10,000 hours.

While the high luminous efficacy is being pursued, integration technologies, modularization, smart control and high energy efficiency also received attentions in 2014: the flip chip is welcomed by LED manufactures gradually but the competitiveness needs further improvement. AC-LED and HV-LED have their own advantages in improving heat sink and reducing energy consumption, but it will take more time to become the mainstream. COB, LED power supply improvements, chip-level packaging and other technologies are getting close on the way of integration, and packaging companies are facing new challenges on development mode. Standardization and modularization are the inevitable choice for cost reduction and large-scale production.

Under the pressure of environmental protection, more attentions are paid to energy consumption and recycling of LED products. The name list of "TOP-Runners" of energy efficiency in the Solid State Lighting industry was released in December 2014, which provides guidance for healthy competition and sustainable development. Hue receives attentions, Goccia activity tracker is released, "Yiguang" App(Indoor precise positioning) is online, and Xiaomi joined hands with Midea etc. all these innovations mark the integration of LEDs and communications, control, sensing technology, information technology, medical science and biotechnology. For the future, judging from the Nobel Prize in Physics winners, the third-generation semiconductor material represented by GaN and SiC is the important direction of technology development.

III. Performance of the listed companies is outstanding and profits are improving

1. Rapid growth of revenues

According to the financial reports of the listed companies, the total revenue of 22 listed companies with the main business of LED in A Shares in the first three quarters in 2014 is 18.61 billion yuan, with an year-on-year growth of 32.4% compared with 2013. The growth rate of revenue in LED sector is higher than that of 29 second-level category sector of Shenyin & Wanguo Securities. Meanwhile, it is higher than the overall A-shares by 26.46 points, and higher than the electronic sector by 7.8 points.

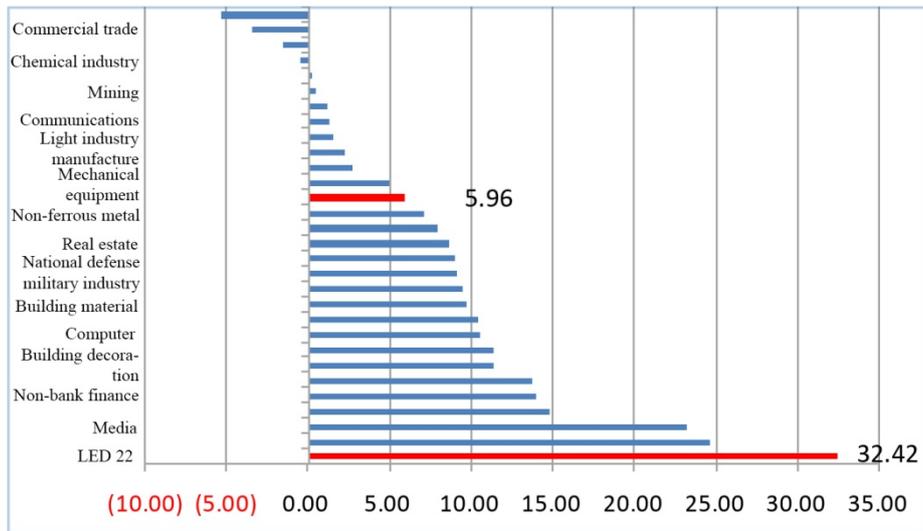


Figure 6 Growth rates of revenues of various plates of listed companies of the first three quarters in 2014

(Source: financial reports of listed companies, CSA)

In the first three quarters of 2014, the accumulated total profit of 22 LED listed companies is 28.2 billion yuan, with an increase of year-on-year basis of 32.4%. It is the same growth rate of revenue, and the "revenue increase without profit increase" situation is improved.

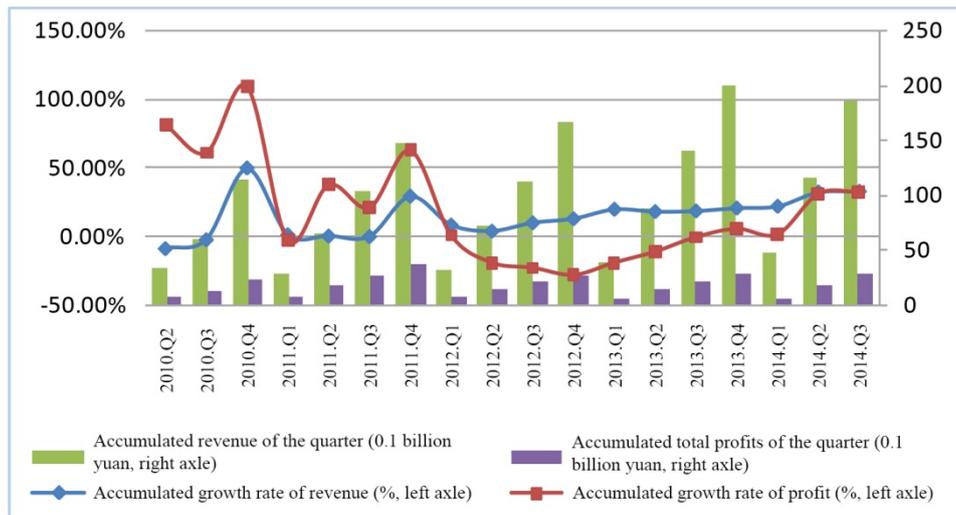


Figure 7 Growth of revenue and total profit of listed companies with the main business of LED in the third quarter from 2010 to 2014

(Source: financial reports of listed companies, CSA)

2. The profitability is improving

The overall profitability of LED listed companies in the first three quarters of 2014 was improving, the profit quality is also slightly improved, and the sales profit rate of 22 LED listed enterprises is 13.2%. Although it is lower than that the corresponding period of last year, it is slightly improved compared with that at the beginning of the year. The causes mainly include two aspects: firstly, in the situation that the prices of various segments of the industrial chain are going down, technology upgrade and technique improvement helped with cost reduction, and drives the overall gross profit rate of the sector to increase by 2 points compared with that at the beginning of the year, which returns to 30%. Secondly, "three expenses", especially the sales expense is slightly reduced compared with that at the beginning of the year.

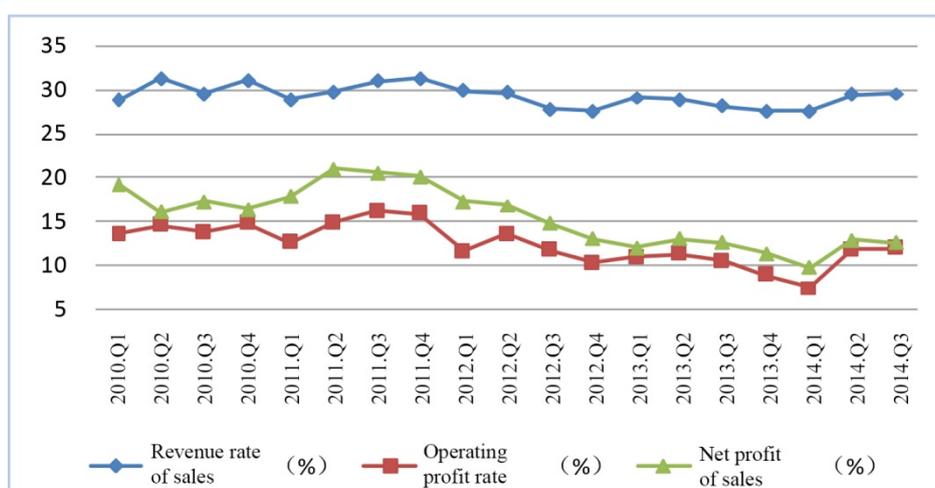


Figure 8 Profitability indicators of listed companies with the main business of LED in the third quarters from 2010 to 2014

(Source: financial reports of listed companies, CSA)

IV. The market is comprehensively started and the price is reduced to the acceptable point

1. Both production and marketing of LED lighting thrive, and market penetration speed is raised.

In 2014, the global lighting industry has entered a new era leading by LED lighting. The output of LED lighting products in China is about 1.67 billion pieces, and the domestic sales volume is about 0.75 billion pieces. The share of LED lighting products in the domestic market (domestic sales quantity of LED lighting products / total domestic sales quantity of lighting products) reaches 16.4%, which is raised by about 7 percentage points from 8.9% in 2013. The commercial lighting is subject to

spur growth; the public lighting grows rapidly; and the residential lighting is launched. In addition, the smart lighting direction is established, which would initiate the LED lighting post-replacement era.

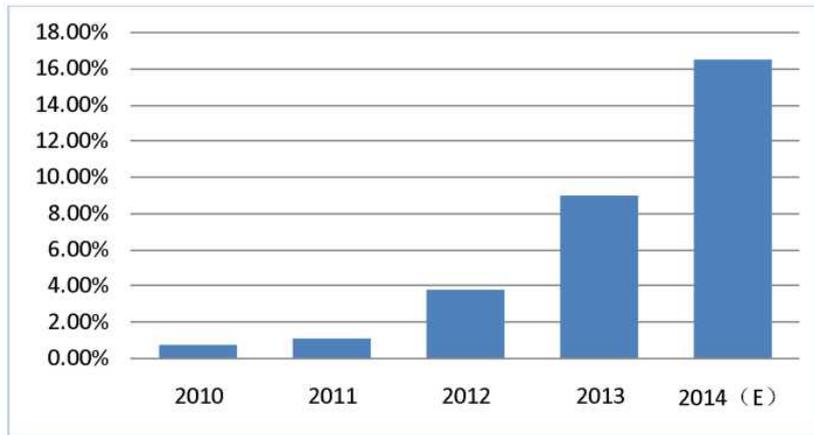


Figure 9 Shares of LED lighting product in China domestic market (domestic sales volume)

(Source: CSA)

2. Enterprises are focusing on channel layout both online and offline

LED lighting product are comprehensively penetrating in the domestic market in 2014, which market has the characteristics of higher in the first half and lower in the second half, channel extending acceleration, rapid development of E-Commerce and accelerated start of second and third tier markets.

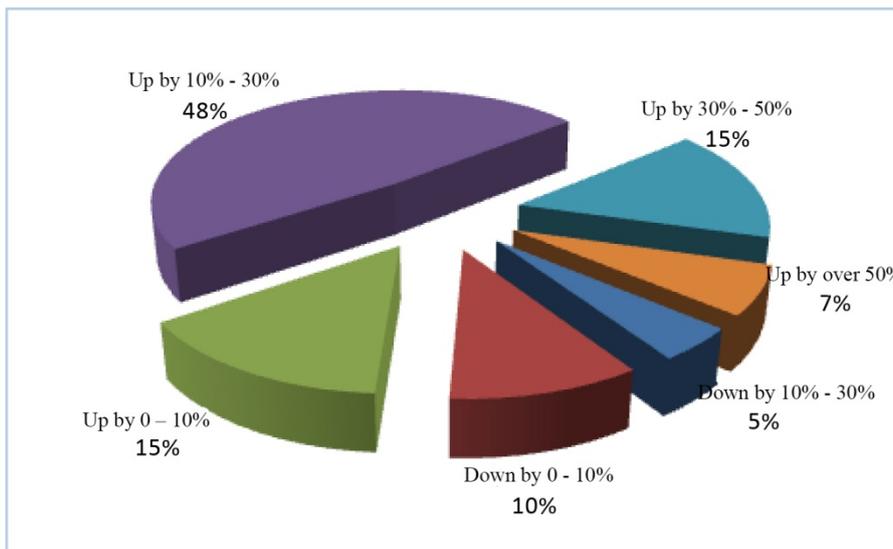


Figure 10 Distribution of growth of sales volume of LED lighting in the first three quarters in 2014

(Source: CSA, Great Lighting Media)

The retail amount of LED lighting products in 2014 is subject to rapid growth. In spite of the influence of the national economic growth slowdown and shrinking of real estate economy in the second half year, the growth of LED lighting product is slightly reduced. However, the growth rate of entity channel dealers is above 25% in the whole year. The growth rate of entity dealer channel in the domestic market in the first three quarters is about 25.5% on year-on-year basis.

In the aspect of the market level and channel, with channels extending acceleration of various suppliers, the lighting market explodes in 2014 level by level. In the first half year, explosion in the second-tier market is obvious, and the overall growth of the sales amount exceeds 30%. Explosion of the third-tier and fourth-tier markets since the three quarter becomes the highlight in the second half year, and the sales amount is increased by about 26% compared with that last year. Where, the main growth point of second-tier and third-tier markets is indoor lighting. Especially the growth rate of supermarket, hotel, office and other commercial lighting exceeds 30%. However, the outdoor lighting expansion is relatively slow, and the residential lighting market is progressively opened.

3. The price has been reduced to the market acceptable point; and the brand product price reduction tends to be mild.

With the technology upgrading and intensifying competition, the prices of LED lighting products in the recent years are continuously decreased. In 2014, the price of LED lighting product has been reduced to the inflection point which can be accepted by the market, and the price difference between the entity channel and the online channel is further reduced. However, the price difference between the brand products and the non-brand products is still relatively remarkable, and price decrease of the brand products is mild.

By December 2014, the price of LED bulb lamp is reduced by about 30% compared with that at the corresponding period of last year, and the decrease is slightly narrowed.

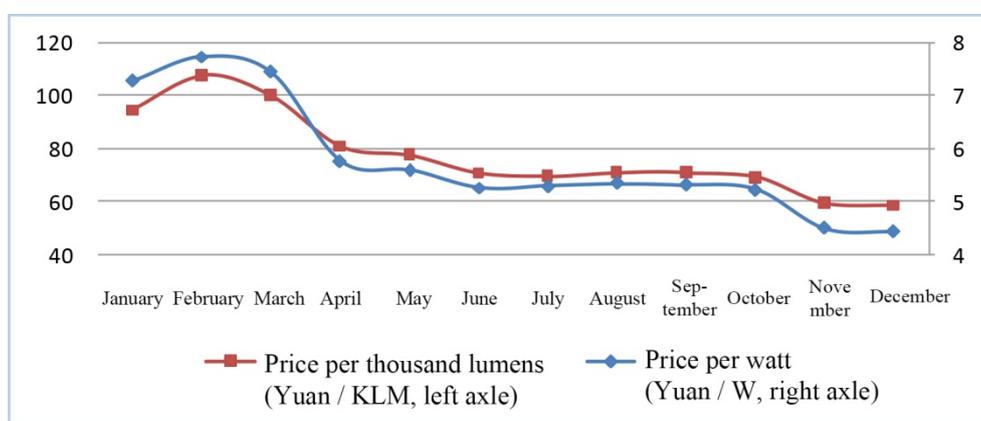


Figure 11 Trend of LED bulb lamp at Taobao in 2014

(Source: CSA)

The performance-price ratio of LED lighting product is approved by the market, so the price is no longer the only concern of the customer. The function of "lighting according to demands" is the key point of product competition and concerned by the consumers. And the price decrease of famous-brand products obviously slows down. However, the "price attacker" stops the offense in the second half year. It is expected that the price will be decreased in the future, and decrease will be narrowed further.

V. Active investment and integration, resources further concentrated

1. Frequent investments, mainly driven by the downstream application

The project investment in the Solid State Lighting industry in China is very active in 2014. The application drives the development of the whole industrial chain, the southeast coast region drives the national development, and the investment scale is focused on middle- and small-scale investments. In 2014, there are about 290 LED-related projects at the environmental impact assessment stage, involving the upstream, middle stream and downstream of LED industrial chain and related material fields covers 24 provinces of China.

In 2014, the application filed becomes the hotspot area of investment, the number of investment projects exceeded 200, accounts for 74.6% of the total number of projects, and the proportions of projects involving industrial supporting and packaging are also large, accounts for 16.7% and 10.8% of the total number of projects respectively. However, the proportion of epitaxial wafer & chip projects is only 3.5%. In the past year, in spite of the adverse effects that sapphire screen is not used on Apple iPhone, the investment of sapphire field is still increasing. The number of investment projects is nearly 20, and the investment amount exceeded 7.5 billion yuan.

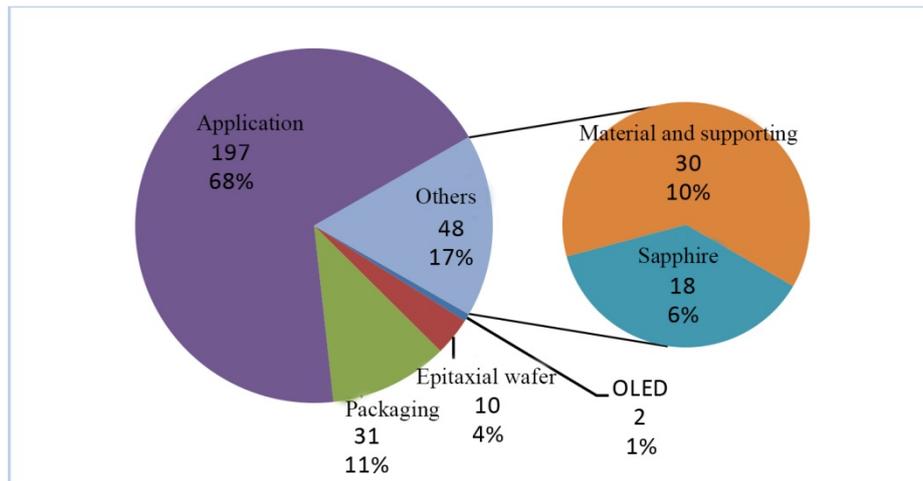


Figure 12 Distribution of segments of industrial chain of LED project in the environmental impact assessment stage in 2014

(Source: the Environmental Protection Departments in various regions, CSA)

Overall speaking, the investment in Solid State Lighting field in China is basically balanced with the pyramid distribution, and the downstream application is becoming the powerful driving force of the overall industry development.

2. Integration and acquisition increasing, strategic layout diversified

Since 2014, in order to deal with competition and consolidate the existing market position, merger and acquisition are favored by many as the most convenient and fast way. Compared with the past few years, integration, merger and acquisition among companies are more frequent at present, the strategic intent is more diversified, the integration direction is also continuously adjusted, and the advantageous resources are further concentrated to the industry leaders.

There were 19 important merger and acquisition in the Solid State Lighting industry in the first half year of 2014. The total amount of disclosed transaction is nearly 10 billion yuan, and the majority of transaction results are to obtain the controlling stake. The purposes of merger and acquisition are more about distribution channel, brand and production capacity besides to extend the industrial chain and realize diversified development.

VI. Rapid export growth and the emerging market rises

The total export amount of LED lighting products in China from January to November in 2014 is around 7.9 billion dollars with a year-on-year growth of 104.52%, which is about 5 times of the export amount in 2011 (1.6 billion dollars).

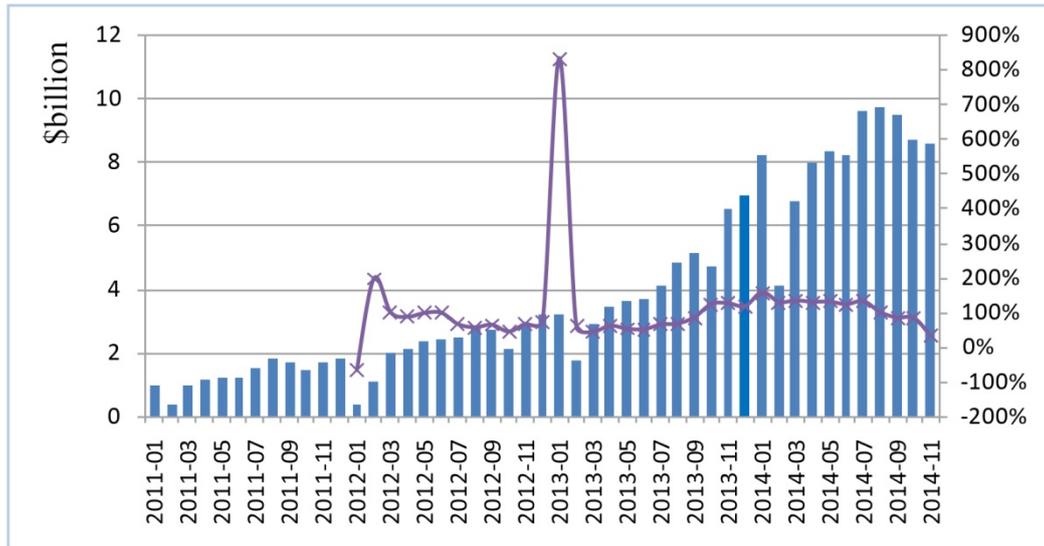


Figure 13 Export of LED lighting products in China from 2011 to 2014

(Source: China Customs, CSA)

In 2014, the top-ten exporting countries and regions of LED lighting product in China are the United States, Russia, Hong Kong of China, Japan, Germany, UK, Spain, Netherlands, Australia and Italy. The export market structure is changed greatly. The total share of three main markets of Europe, America and Japan is 50.2%, and the markets of Europe and America has subject to rapid growth. However, the market share is slightly reduced. The BRICS, Middle East, Southeast Asia and other emerging markets rise, which market shares are improved in various degrees. The growth in market share is 6.82% in BRICS, 2.11% in the Middle East and 1.34% in Southeast Asia.

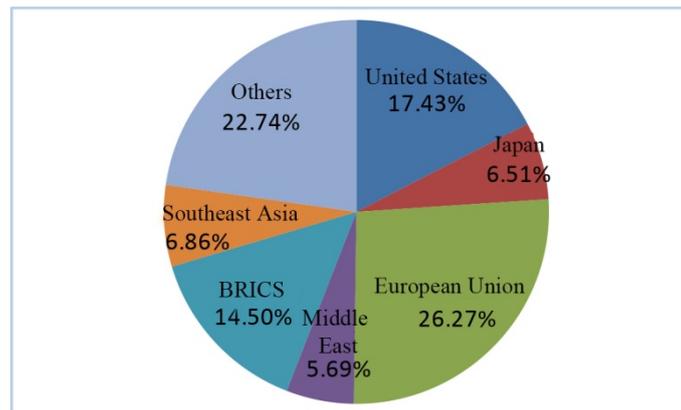


Figure 14 Export market structure of LED lighting products in China 2014

(Source: China Customs, CSA)

In the aspect of the exported product type, four types of light sources including the tubing lamp, bulb lamp, light bar and spot light still account for 64.4% of overall export. Meanwhile, the proportion of interior decoration lamp, flat lamp and other products with high value added in 2014 is significantly

increased compared with that in 2013.

VII. 2015 industry development forecast

Driven by technology progress and market demands, the Solid State Lighting industry will enter another new round of rapid growth, towards the direction of higher efficacy, lower cost, higher reliability and wider applications. Cross-field integration is emerging, which will deliver products with advanced technology and added value. In 2015, the industry is expected to continue rapid growth, with the overall growth rate more than 35%.

The technology will embrace more integration. The chip level light source technology with integrated circuit, multifunction system integration packaging technology, more than packaging LED module technology and so on will be continuously focused. The main development directions of application products and systems are standardized, modularized, low cost, high reliability and high efficacy. LED technology will be deeply integrated with the new-generation information technology, showing the development trends of intelligent, remote control, digital and interconnected.

Meanwhile, with accelerated industry transformation, the passive or active merger and acquisition has been the inevitable trend. The product application is shifting from technology innovation to business model transformation of application solutions and integrated service innovation, the "online and offline" distribution channels will be further integrated, thus will cause many adjustments of marketing models.

In addition, the market is mainly focused on retrofit. However, driven by the stimulation of domestic demands and export growth, the general lighting market is booming, and the innovation application is emerging, which will release more production capacities from upstream and downstream. In 2015, the prosperity index of the Solid State Lighting market in China will continue improving.