

# The Worldwide Market for LEDs

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## *Market Review and Forecast 2019*

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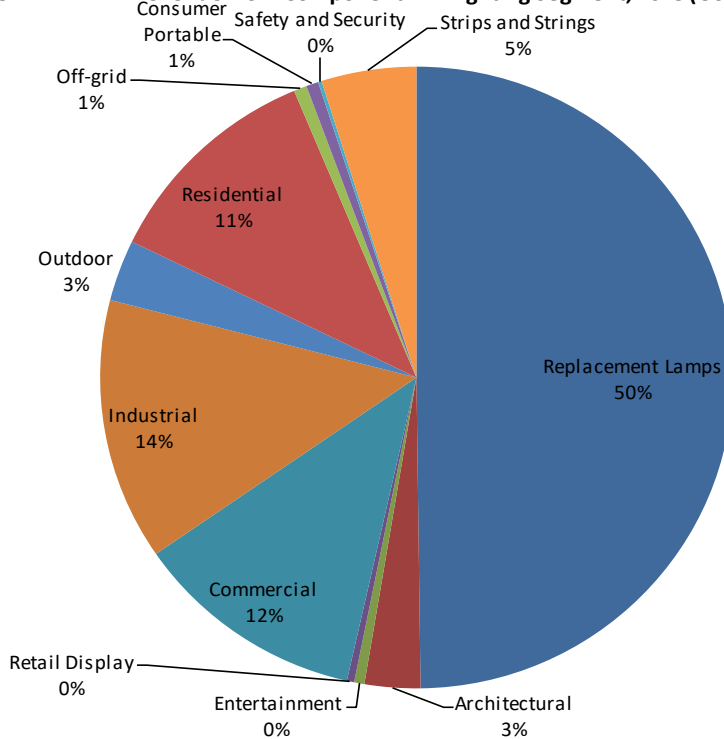


# EXECUTIVE SUMMARY

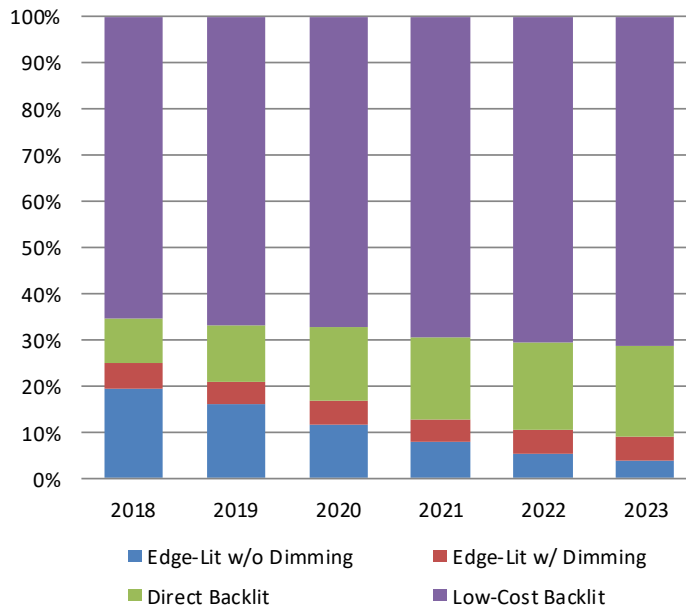
# Chapter 1: Executive Summary



**Figure 1.2 LED Revenue from Component LED Lighting Segment, 2018 (US\$M)**



**Figure 1.3 LED TVs by Backlight Technology, 2018-2023**





# Chapter 1: Executive Summary

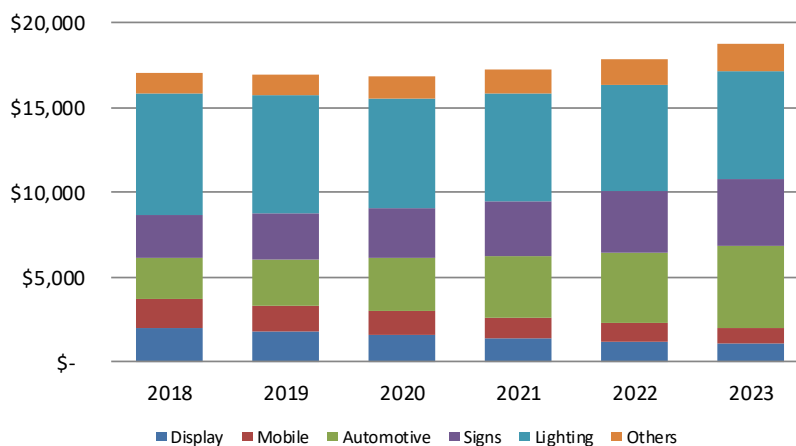


## Market Forecast

- In 2018, price erosions for LED packages continued to decline and the mobile and display segments continued to slow down. Even the lighting segment encountered a slight decline. The 5-year CAGR is 1.9% growth.
- Lighting, which has typically been a high growth segment, saw a recovery growth in 2017 thanks to mild price erosion. However, in 2018, we saw price erosion continue to widen and expect lighting to slightly decline by about 3.5% in 2019.
- The Chinese sign market will have steady growth at a 10% 5-year CAGR
- Automotive will continue to be a strong growth market, as more cars adopt LED headlamps and daytime running lights. This market is expected to grow 14.5% year over year until 2023, thanks in large part to alternative energy cars.
- Both mobile and TV/Monitor backlighting are expected to have declining LED revenues over the next 5 years. Monitors and TVs are expected to be hit by both slow growth and a decrease in LED revenue per device. Mobile had an unexpected slowdown which contributed to its decline, and will continue to be impacted by an increase in OLED screens.
- During 4Q18, the price erosion continue to happen because China expanded capacity in the second half of 2018, which led to oversupply. In addition, the trade war between China and USA increased market uncertainty and led to weak demand. There will be a risk of trade war continuation in the first half of 2019. We expect the weak demand to continue to affect market growth in 2019.



**Figure 1.10 LED Market Revenue Bar, 2018-2023 (\$M)**

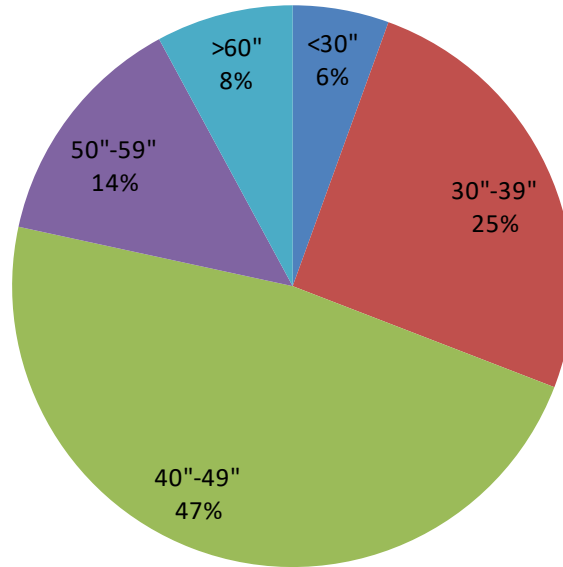




# Chapter 2: Applications – Display Backlighting

## Display Backlight for LED TVs Market Overview

Figure 2.1.2 LED TVs by Size, 2018 (M)



- The LCD TV market increased to approximately 254 million units in 2018, up from about 249 million units in 2017. The LED TV penetration rate is currently about 99%.
- Plasma TV has totally faded out since 2016, and LED TVs dominate the TV market.
- Roughly 31% of TVs shipped were smaller than 40" in 2018. The average TV in 2018 was approximately 50" in the US, with a global average of 44". We expect this size to increase by 1.5" in 2019, thanks to price drop and size migration. The entry level TV size is expected to increase in 2019 to 43" from 32".
- Like with high-res tablets and notebook screens, 4K TVs and monitors can require additional backlighting and LED unit usage. We expect 4K TV to grow significantly, and the penetration rate to increase to 47% in 2019 from 38% in 2018. We expect the demand of 65" and 75" TV to increase in 2019 as well.
- This penetration will continue to grow as prices naturally come down. We expect that the penetration rate to reach between 80% to 85% by 2023.





## Chapter 2: Applications – Automotive Lighting

### Market Factors

- Federal Motor Vehicle Safety Standard 108 requires bulb outage detection for turn signals. If LEDs are used for turn signals (rear or front), a special flasher module has to replace the usual flasher module that comes free with the rest of the system, adding extra cost. Cadillac and BMW have made the investment in their vehicle electronics to support this function, but the extra cost will continue to impede widespread adoption of this function. Again, this is another case of regulations not keeping up with technology.
- Rear turn signals have begun to use PC Amber (see section on Front Turn Signal) as they become more widely available and cost effective.
- PC (phosphor-coated) Amber, a blue InGaN chip coated with special phosphor, does not experience the temperature sensitivity that InGaAlP amber LEDs can experience. InGaN technology can inherently tolerate higher temperatures and does not exhibit the color shift of InGaAlP.
- Since DRLs in the U.S. can be either amber or white, some auto designers have decided to combine amber turn signals and DRLs into one unit.
- As noted earlier, Federal Motor Vehicle Safety Standard 108 requires bulb outage detection for turn signals. Red signal lamps have the same issue.
- Since this segment is small, the revenue is lumped with “Others” in the charts.





## Chapter 2: Applications – Mobile Applications

The mobile phone handset market is divided into three main categories:

- **Feature phone:**
  - A phone with pre-set functions that doesn't run an identifiable operating system. This type of phone usually has one or two LCD screens and a numeric keypad, although increasingly feature phones are including a touch screen.
- **Smartphone:**
  - A phone that runs an identifiable operating system like iOS, Android, Windows Mobile, BlackberryOS, etc.
  - Preeminent smartphones feature touch screens, and many are keyboard-less. Almost all smartphones have a camera or two and a flash, although better CCD sensors on high-end smartphones and strong price pressures on low-cost smartphones are making the flash on some phones less common.
- The unit sales numbers in Figure 2.3.2 for this year are comprised of feature phone and smartphone sales and forecasts, plus estimates of bandit phone sales. The numbers for basic phones have been combined with feature phones. For 2018, the breakdown is:
  - Feature phone — 501 million
  - Smartphone — 1,590 million

