Expenses relating to our license fees and royalty payments under existing license agreements were ₩69 billion in 2014, ₩88 billion in 2015 and ₩94 billion (US$78 million) in 2016, representing 4.0% of our research and development related expenditures in 2014, 5.7% in 2015 and 6.6% in 2016. We expect to make additional license fee payments as we enter into new technology license agreements from time to time with third parties.

Taxation

In 2016, the statutory corporate income tax rate applicable to us was 11.0% (including local income surtax) for the first ₩200 million of our taxable income, 22.0% (including local income surtax) for our taxable income between ₩200 million and ₩20 billion and 24.2% (including local income surtax) for our taxable income in excess of ₩20 billion.

Tax Credits

We are entitled to a number of tax credits relating to certain investments in technology and human resources development. For example, under the Special Tax Treatment Control Law, we are entitled to a tax credit of up to 4% for our capital investments made outside certain areas of Seoul on or before December 31, 2017 provided that there isn't a decrease in the number of our employees compared to the previous year.

Tax credits not utilized in the fiscal year during which the relevant investment was made may be carried forward over the next five years in the case of capital investments and five years in the case of investments relating to technology and human resources development. As of December 31, 2016, we had available deferred tax assets related to these credits of ₩287 billion (US$239 million), which may be utilized against future income tax liabilities through 2021. In addition, we also had unused tax credit carryforwards of ₩108 billion (US$90 million) as of December 31, 2016 for which no deferred tax asset was recognized.

Item 5.C. ***Research and Development, Patents and Licenses, etc.***

Research and Development

The display panel industry is subject to rapid technological changes. We believe that effective research and development is essential to maintaining our position as one of the industry's leading technology innovators. Our research and development related expenditures amounted to ₩1,788 billion in 2014, ₩1,547 billion in 2015 and ₩1,423 billion (US$1,182 million) in 2016, representing 6.8% of our revenue in 2014, 5.4% in 2015 and 5.4% in 2016.

To meet the demands of the future trends, we have formulated a long-term research and development strategy aimed at enhancing the process, device and design aspects of the existing products and diversifying the use of display panels as new opportunities arise with the development of communication systems and information technology. The following are examples of products and technologies that have been developed through our research and development activities in recent years:

- In 2014, we unveiled a 98-inch Quad Ultra HD television panel, which has four times the resolution (7,680 x 4,320 pixels) of a conventional Ultra HD panel. We also developed an 18-inch transparent OLED panel (transparency level of 30%) and an 18-inch flexible OLED panel with a radius of curvature of 30 mm. We successfully commercialized a 1.3-inch circular plastic OLED smartwatch panel for LG Electronics' G Watch R smartwatch and a 5.5-inch Full HD plastic OLED smartphone panel for LG Electronics' G Flex 2 smartphone. In addition, we successfully commenced mass production of display panels incorporating three state-of-the-art technologies: M+ pixel structure, Ultraviolet Alignment and Advanced In-cell Touch, or in-TOUCH, technologies. M+ pixel structure technology improves transmittance and reduces power consumption. Ultraviolet Alignment technology utilizes ultraviolet light to more effectively align liquid crystals and improves contrast ratio and reproduction. In-TOUCH technology reduces the thickness of a touch panel as touch technology is built into the panel cell as opposed to the existing on-cell method, whereby a touch film is added on top of the panel.

- In 2015, we developed the world's first Ultra HD OLED television panels, including 65-inch and 77-inch panels that feature High Dynamic Range functionality with perfect black and improved luminance. In addition, we unveiled a 55-inch "wallpaper" OLED television panel which was slim and light enough to attach to the wall simply by using magnets or wires. We were able to achieve this width using an innovative production method whereby the electric circuits are installed in a separate process. In the commercial space, we developed the world's first 55-inch double-sided OLED panel for commercial use, which shows different images on each side while achieving a width of only 5.3 mm, as well as a 139-inch Vertical Tiling OLED display that is made of eight 65-inch OLED panels connected together in a double-sided S-curved pattern. We also successfully commenced mass production of in-TOUCH panels for notebook computers. With respect to smartphones, we developed the world's first 5.5-inch Quad HD in-TOUCH panel and the world's first 5.7-inch free-form Quad HD panel.
- In 2016, we developed a wallpaper-thin 65-inch OLED television panel with a thickness of 2.57mm. In addition, we unveiled a 65-inch Ultra HD OLED television panel with speakers integrated into the display, which we call " Crystal Sound OLED," or "CSO," and we developed a 65-inch ultra-slim OLED television panel that applies High Dynamic Range technology to achieve 800 nit peak luminance and improved display quality. We also developed a 55-inch Full HD transparent OLED television panel, with a transparency level of 40%. In the case of LCD panels, we developed the world's first 86-inch ultra-stretch format LCD television panel with a 58:9 screen aspect ratio. With respect to monitors, we successfully developed the world's first in-TOUCH monitor panel as well as the world's largest, at the time, 21:9 screen aspect ratio IPS curved monitor utilizing Ultra Wide Quad HD technology. With respect to smartphones, we introduced our "Always-On Display" technology which enables the display of 24-hour information such as date, day, time, and battery status even when the screen is off, and reduces unnecessary power waste. We also unveiled the world's first 12.3-inch transparent OLED display and 6.13-inch mirror display for Glass OLED. In addition, we are developing Cluster and Center Information Display technology for plastic OLED applications in the automotive market.

As the product life cycle of display panels using certain of the existing TFT-LCD technology is approaching maturity, we plan to further focus on OLED and other newer display technologies, while also exploring new growth opportunities in the application of display panels, such as in tablet computers, smartphones, smartwatches, public displays and automotive displays.

In order to maintain our position as one of the industry's technology leaders, we believe it is important not only to increase direct spending on research and development, but also to manage our research and development capability effectively in order to successfully implement our long-term strategy. In connection with our efforts to consolidate our research and development efforts for next-generation display technologies, we opened the R&D Center in Paju, Korea in April 2012.

We complement our in-house research and development capability with collaborations with universities and other third parties. For example, we provide project-based funding to both domestic and overseas universities as a means to recruit promising engineering students and to research and develop new technologies. In July 2012, we entered into an agreement with Seoul National University to establish the LGD-SNU Cooperation Center within the university's Research Institute of Advanced Materials to conduct research into display panel technologies, including OLED technology. We also enter into joint research and development agreements from time to time with third parties for the development of technologies in specific fields. In addition, we belong to several display industry consortia, and we receive annual government funding to support our research and development efforts. As of December 31, 2016, we employed over 4,600 engineers, researchers, designers, technicians and support personnel in connection with our research and development activities.

While we primarily rely on our own capacity for the development of new technologies in the display panel design and manufacturing process, we rely on third parties for certain key technologies to enhance our technology leadership, as further described in "—Intellectual Property" below.

Intellectual Property

Overview

Our business has benefited from our patent portfolio, which includes patents for display technologies, manufacturing processes, products and applications related to the production of TFT-LCD and OLED panels. We hold a large number of patents in Korea and in other countries, including in the United States, China, Japan, Germany, France, Great Britain and Taiwan. These patents will expire at various dates upon the expiration of their respective terms ranging from 2017 to 2036. In March 2014, we formed Unified Innovative Technology, LLC in the United States, a limited liability company solely owned by us for the purpose of patent portfolio management.