

**Market Forecast Report
Semiconductor and FPD Manufacturing Equipment
Released in July 2019
(Fiscal years 2019-2021)**

July 4, 2019

SEAJ

Semiconductor Equipment Association of Japan

Overview

This report provides trend forecasts for semiconductor and FPD manufacturing equipment. The comprehensive results included in this forecast report are based on demand forecasts by the Semiconductor Research and Statistics subcommittee and the FPD Research and Statistics subcommittee of the Semiconductor Equipment Association of Japan (hereinafter called SEAJ, Chairman: Mr. Kazuo Ushida) as well as market trend research by the 20 companies represented on the Board of Directors and auditors.

Due to the major effects of the slowdown in memory investments, we forecast sales of semiconductor manufacturing equipment made in Japan for fiscal 2019 to be 2.0002 trillion yen, a decrease of 11.0% from the previous year. For fiscal 2020, supported by recovering memory investments and steady logic and foundry investments, we forecast sales of 2.2079 trillion yen, an increase of 10.4%. For fiscal 2021, assuming that the sector continues to grow, we forecast sales of 2.3712 trillion yen, an increase of 7.4%.

As far as FPD manufacturing equipment is concerned, China currently plays a leading role in investing in both G6 substrate OLED (organic EL) and G10.5 substrate LCDs. For fiscal 2019, we forecast sales of 530 billion yen, a decrease of 1.2% (down 16.1% from the previous year when based on the same statistical standards as the previous year), partly because the second half of the year represents a trough in OLED investments. For fiscal 2020, we forecast sales of 540.6 billion yen, an increase of 2.0%. For fiscal 2021, taking into consideration South Korea's resumption of hitherto postponed OLED investments, we forecast sales of 556.8 billion yen, an increase of 3.0%.

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|---------------------|---|
| (1) Forecast period | Three years from fiscal year 2019 to 2021 |
| (2) Forecast items | Sales of Japanese-made semiconductor manufacturing equipment and sales for the Japanese market
Sales of Japanese-made FPD manufacturing equipment*
(* Since the number of companies participating in FPD statistics has changed, sales for fiscal 2019 are posted based on both the new and old standards.) |

- (3) Forecast background

(Semiconductor Manufacturing Equipment)

In its April announcement, the IMF revised the world economy's growth rate in 2019, which it had published in January, downward by 0.2 percentage points, to an increase of 3.3%. This reduction was attributed to the substantial slowdown in the second half of 2018. In the announcement, the IMF predicted that the world economy would recover in the second half of 2019, but there is a growing risk of a downturn for reasons such as the intensifying trade disputes between the United States and China, Brexit issues, and the instability of financial

markets. The world economy is forecast to recover in 2020, registering 3.6% growth, and continue to grow at a rate of 3.6% in 2021.

During the past several years, applications related to data centers such as servers and SSDs have substantially increased atop existing demand for PCs and smartphones, driving semiconductor consumption. At present, demand for data centers is temporarily sluggish, but from a medium-term perspective, due to 5G mobile communications, the IoT, self-driving and technological innovation in AI, semiconductor demand is expected to expand at multiple levels in the future.

According to WSTS, in 2018 the global semiconductor market grew 13.7%, which is less than the 15.9% predicted last autumn, because memory prices began to fall, though they soared toward the end of the year. Memory prices fell further in early 2019, and in its spring forecast, WSTS predicted that in 2019, the global semiconductor market would fall 12.1%, a substantial downward revision to its autumn forecast of 3.8% growth. In 2020, the memory market is expected to recover as well, boosting the global semiconductor market to positive growth by registering an overall increase of 5.4%.

In 2019, logic manufacturers and foundries will continue to invest steadily in plants and equipment, but because memory manufacturers plan to substantially reduce investments for both DRAM and 3D-NAND, data collected by SEAJ indicates that overall capital investments will fall 16-19% compared to the previous year. Memory investments are expected to recover in 2020.

(FPD Manufacturing Equipment)

The operating profit ratio of major panel manufacturers in South Korea, Taiwan and Japan has continued fall, after it peaked at an average of 10% in 2017 Q2 (April to June). while South Korean 2 companies has also recorded an operating loss in 2019 Q1 (January to March) .

South Korean manufacturers alone can supply a sufficient amount of small- to mid-size OLED panels; at present, investments in new plants are being made mainly in China. In terms of large panels, too, G10.5 substrate LCD investments are concentrated in China. Results for fiscal 2018 show that China accounted for 78% of total investments in both markets.

If all G10.5 LCD investments are made in China as planned, the overall production capacity will become enormous, prompting manufacturers in other countries to suspend operation of existing lines and divert them for new technology. Up to 2020, investment plans focus on increasing production capacity, but from 2021 onward, since the important point is to distinguish G10.5 LCDs from existing displays, demand may fluctuate significantly depending on manufacturers' business policies. Demand fluctuation factors will become more severe, but trends in technological differentiation among panel manufacturers can positively be considered as new business opportunities for equipment manufacturers.

(4) Forecast results

[Sales forecasts for semiconductor/FPD manufacturing equipment and equipment made in Japan]

For fiscal 2019, assuming that sales of semiconductor manufacturing equipment will fall 11.0% and sales of FPD manufacturing equipment will drop 1.2% (down 16.1% when compared to the previous year based on the same statistical standards as the previous year), we forecast overall sales of 2.5302 trillion yen, a decrease of 9.1% (down 12.0% when based on the same statistical standards as the previous year). For fiscal 2020, as semiconductor investments are expected to recover, we forecast overall sales of 2.7485 trillion yen, an increase of 8.6%. For fiscal 2021, with the expectation that the semiconductor industry will return to its original growth track, we forecast overall sales of 2.9280 trillion yen, an increase of 6.5%.

[Sales forecasts for semiconductor manufacturing equipment and equipment made in Japan]

For fiscal 2019, as equipment demand remains sluggish due to the reduction in investments by memory manufacturers, we forecast sales of 2.0002 trillion yen, a decrease of 11.0%. For fiscal 2020, expecting memory manufacturers' investments to recover, we forecast sales of 2.2079 trillion yen, an increase of 10.4%, and for fiscal 2021, expecting equipment demand to continue to recover, we forecast sales of 2.3712 trillion yen, an increase of 7.4%.

[Sales forecasts for semiconductor manufacturing equipment and the Japanese market]

For fiscal 2019, following the slowdown in investments among memory manufacturers, we forecast sales of 798.4 billion yen, a decrease of 19.2%. For fiscal 2020, expecting memory investments to recover and image sensor investments to continue, we forecast sales of 938.5 billion yen, an increase of 17.6%. For fiscal 2021, anticipating growth to continue, we forecast sales of 1.0080 trillion yen, an increase of 7.4%.

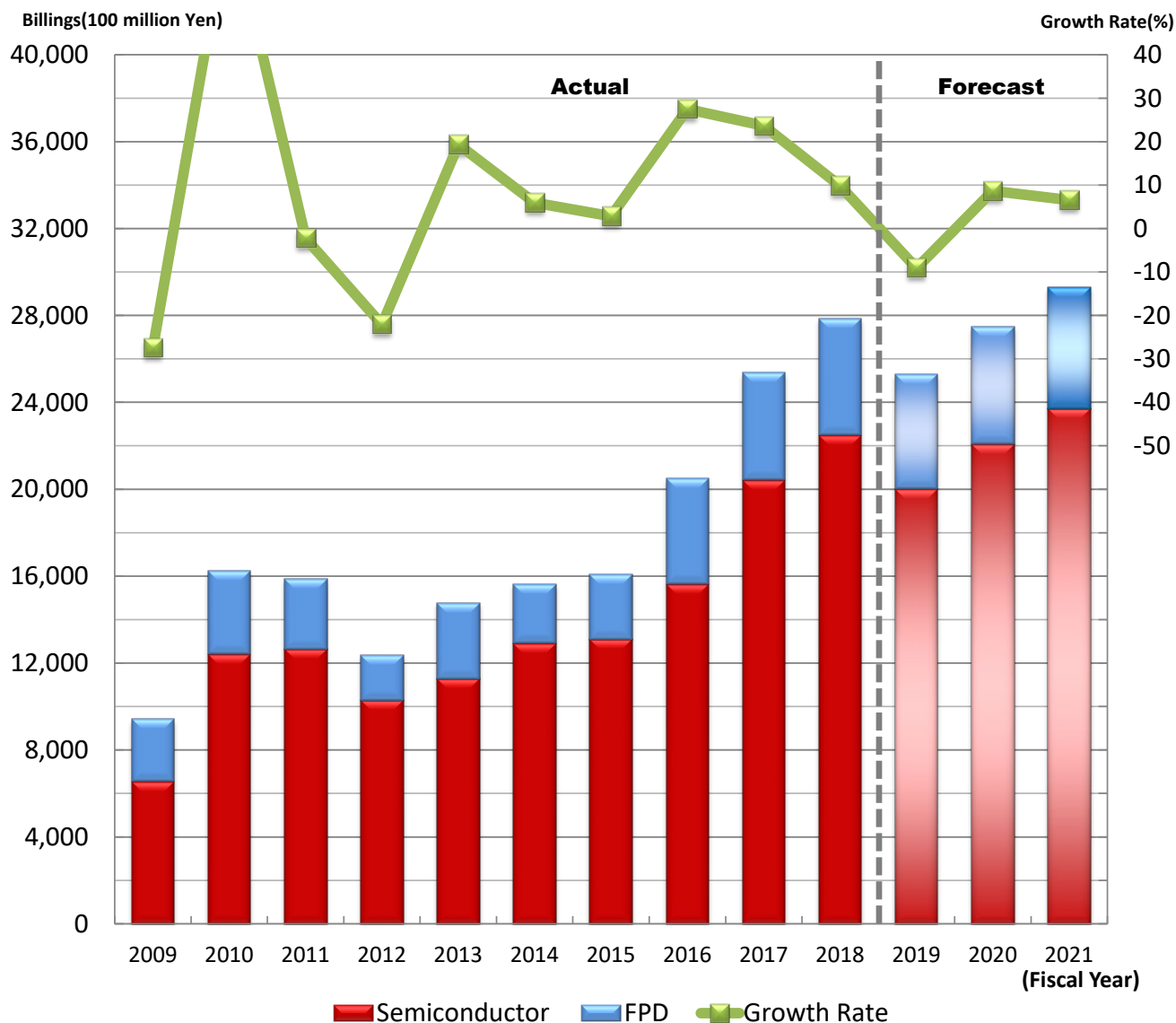
[Sales forecasts for FPD manufacturing equipment and equipment made in Japan]

For fiscal 2019, we forecast sales of 530 billion yen, a decrease of 1.2% (down 16.1% when based on the same statistical standards as the previous year) because G10.5 substrate LCD investments are being made in China as planned but the timing for G6 substrate OLED investments has fallen into a trough in demand. For fiscal 2020, we forecast sales of 540.6 billion yen, an increase of 2.0%. For fiscal 2021, taking into account South Korea's resumption of hitherto postponed OLED investments, we forecast sales of 556.8 billion yen, an increase of 3.0%.

July 2019 Forecast for Semiconductor and FPD Manufacturing Equipment

1. Semiconductor and FPD Manufacturing Equipment 【Forecast for Japanese Equipment Billing】

* "Japanese Equipment Billing " = Japanese manufacturers Domestic and Oversea Billing.



(CAGR : 2018-2021)

Fiscal Year	Actual										Forecast			CAGR
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	
Semiconductor	6,528	12,415	12,637	10,284	11,278	12,921	13,089	15,642	20,436	22,479	20,002	22,079	23,712	1.7%
FPD	2,887	3,840	3,250	2,089	3,485	2,717	2,993	4,857	4,916	5,364	5,300	5,406	5,568	
Total (100 million yen)	9,415	16,255	15,887	12,373	14,763	15,638	16,082	20,499	25,352	27,843	25,302	27,485	29,280	
Growth Rate (%)	-27.5	72.7	-2.3	-22.1	19.3	5.9	2.8	27.5	23.7	9.8	-9.1	8.6	6.5	

The above is the new standard: After change in statistics participating companies

The following is the old standard: Before the change in statistics participating companies

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*The company name and the amount in the change of statistics participating company are not disclosed.

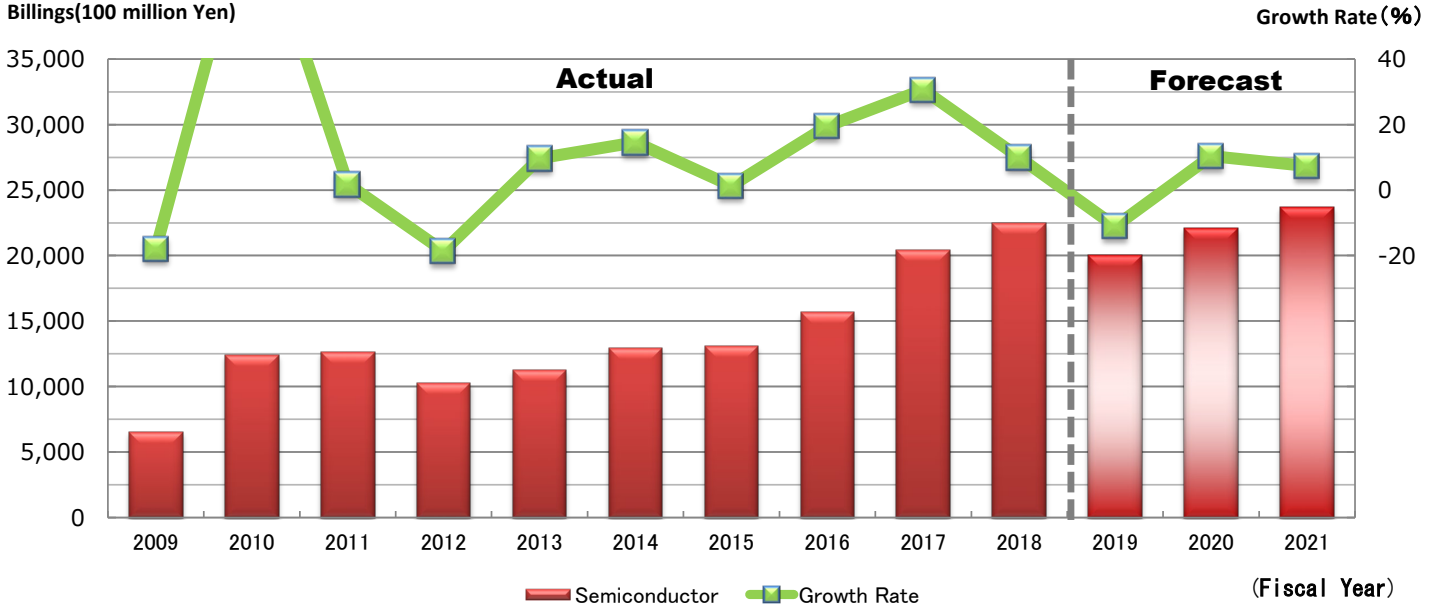
Fiscal Year	2019	2020	2021	CAGR
Semiconductor	20,002			
FPD	4,500			
Total (100 million yen)	24,502			
Growth Rate (%)	-12.0			

July 2019 Forecast for Semiconductor Manufacturing Equipment

■ 2. Semiconductor Manufacturing Equipment 【Forecast for Japanese Equipment Billing】

* "Japanese Equipment Billing" = Japanese manufacturers Domestic and Oversea Billing.

Billings(100 million Yen)



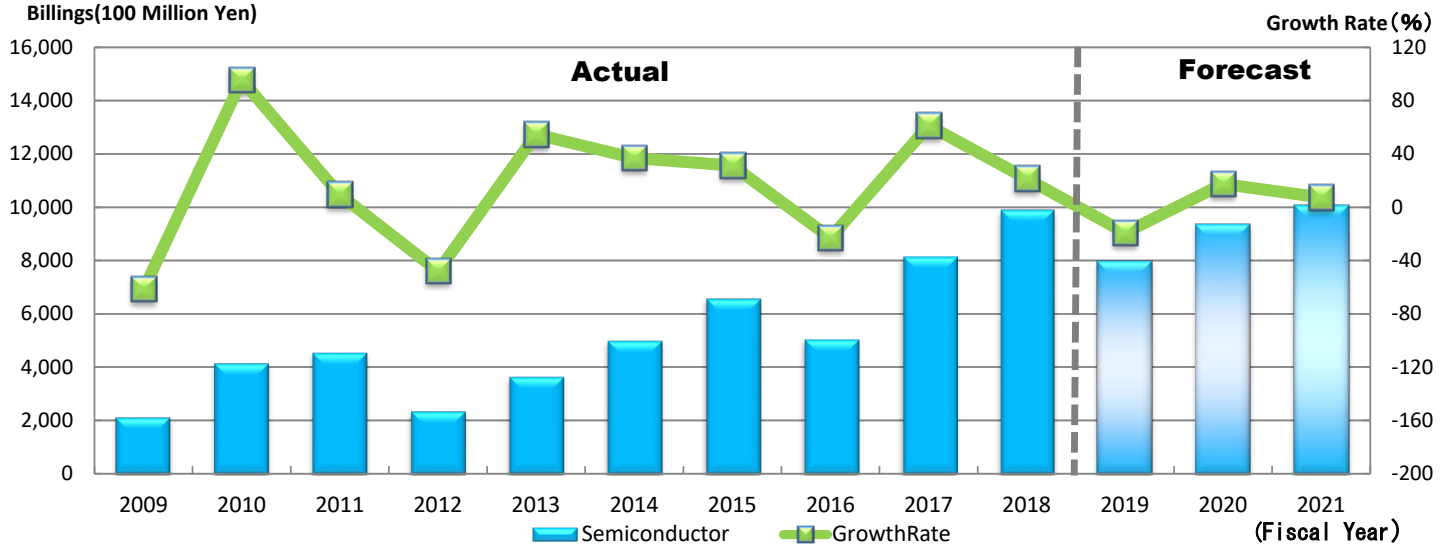
(CAGR : 2018-2021)

Fiscal Year	Actual										Forecast			CAGR
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	
Total (100 million yen)	6,528	12,415	12,637	10,284	11,278	12,921	13,089	15,642	20,436	22,479	20,002	22,079	23,712	1.8%
Growth Rate (%)	-17.9	90.2	1.8	-18.6	9.7	14.6	1.3	19.5	30.6	10.0	-11.0	10.4	7.4	

【Forecast for Japanese Market Billing】

* "Japanese Market Billing" = Domestic Billing of Japanese and Foreign manufacturers.

Billings(100 Million Yen)



(CAGR : 2018-2021)

Fiscal Year	Actual										Forecast			CAGR
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	
Total (100 million yen)	2,130	4,162	4,552	2,363	3,653	5,000	6,562	5,047	8,138	9,878	7,984	9,385	10,080	0.7%
Growth Rate (%)	-61.7	95.4	9.4	-48.1	54.6	36.9	31.2	-23.1	61.3	21.4	-19.2	17.6	7.4	

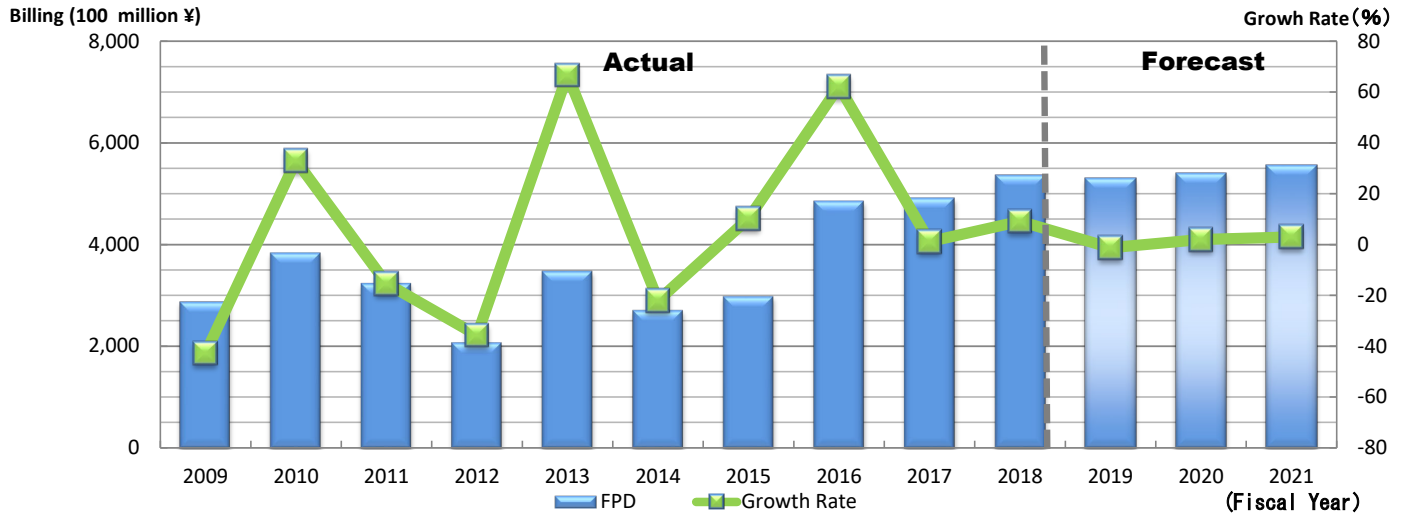
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July 2019 Forecast for Semiconductor and FPD Manufacturing Equipment

■ 3. FPD Manufacturing Equipment

【Forecast for Japanese Equipment Billing】

* "Japanese Equipment Billing " = Japanese manufacturers Domestic and Oversea Billing.



(CAGR : 2018-2021)

Fiscal Year	Actual										Forecast			CAGR
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	
Total (100 million yen)	2,887	3,840	3,250	2,089	3,485	2,717	2,993	4,857	4,916	5,364	5,300	5,406	5,568	
Growth Rate (%)	-42.6	33.0	-15.4	-35.7	66.8	-22.0	10.2	62.3	1.2	9.1	-1.2	2.0	3.0	1.3%

The above is the new standard: After change in statistics participating companies
The following is the old standard: Before the change in statistics participating companies

*The company name and the amount in the change of statistics participating company are not disclosed.

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Fiscal Year	2019	2020	2021	CAGR
Total (100 million yen)	4,500			
Growth Rate (%)	-16.1			