Semiconductors

We will continue increasing our power semiconductor production capacity to expand our business in the markets for electrified vehicles and renewable energy.

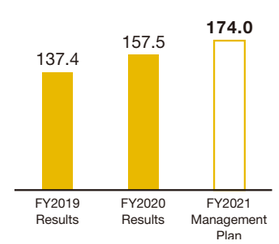
Toru Housen

Managing Executive Officer

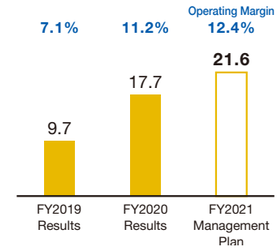
Corporate General Manager, Semiconductors Business Group

Business Areas	Industrial field, Automotive field, Information field
Supplied to	**[Industry]** Inverters, Machine tools, Air conditioners, Solar and wind power, Electric railways **[Automobile]** Motor drives for electrified vehicles (EVs, HEVs, etc.), Engine control, Brake control **[Information]** [Media] Hard disks (data centers, PCs) [Photoconductors] Copiers, printers
Strengths	**[Power semiconductors]** • Proprietary devices that greatly improve power conversion efficiency • Packaging technologies that achieve high levels of heat dissipation and reliability • Product development capabilities of IGBT modules that contribute to increasing the efficiency, compactness, and reliability of power electronics

Net Sales
(Billions of yen)



Operating Income
(Billions of yen)



Awareness of Market Needs and Business Opportunities

Power semiconductors help save energy thanks to their high levels of conversion efficiency and power control. Demand for these devices is rising globally due to various factors. These include increases in energy consumption due to economic growth and technological progress, environmental regulations, and growing investments in automation in the manufacturing sector.

In the automotive field, the shift from gasoline-powered vehicles to electrified vehicles (xEVs) is gaining momentum in various countries around the world, and demand for power semiconductors is expected to grow, including for inverters used to drive xEV motors.

In the industrial field, we look forward to growth in demand for these devices used in multiple applications. In addition to the high-speed communication standard (5G) and semiconductor manufacturing equipment, these include renewable energy fields, such as solar and wind power, bolstered by rising demand for clean energy, as well as energy-efficient air conditioners, mainly in China.

Fiscal 2020 Results and Fiscal 2021 Business Plan

In fiscal 2020, the rapidly expanding market for automobile electrification led to an increase in the number of manufacturers and vehicle models using power semiconductors for xEVs, resulting in a significant jump in sales of these devices used in automobiles. We also posted increased sales of power semiconductors for use in renewable energy fields, such as solar and wind power generation, as well as in factory automation and air conditioners, mainly in the Chinese market. As a result, sales in this segment climbed ¥20.1 billion year on year, to ¥157.5 billion. Despite an increased in expenses related to investments to increase our power semiconductor production capacity, operating income rose ¥7.9 billion, to ¥17.7 billion, due to increases in sales and production volumes.

In fiscal 2021, we will work to increase orders for power semiconductors—targeting the markets for xEVs, renewable energy, factory automation, and air conditioners, mainly in China, where demand remains strong—while continuing to increase our production capacity. For the year, we forecast sales of ¥174.0 billion, up ¥16.5 billion year on year, and operating income of ¥21.6 billion, up ¥3.9 billion.

Priority Measures

Accelerating use of power semiconductors for xEVs

In fiscal 2020, sales of automotive products increased significantly over the previous year thanks to our full-scale manufacturing of the 4th-generation direct liquid cooling modules, whose mass production began in fiscal 2019, as well as an increase in the number of vehicle models using those modules.

Our 4th-generation direct liquid cooling module is a power semiconductor for xEV motor drive inverters with 36% higher power density than conventional devices. It incorporates RC-IGBT*, which we developed independently ahead of our competitors, and uses a direct liquid cooling structure with higher heat dissipation performance than previous products. It contributes to higher efficiency, smaller size, and lighter weight of equipment on which it is installed.

Anticipating further growth in the xEV market, in fiscal 2021 we will continue working to broaden the adoption of our products, with the aim of generating sales growth exceeding that of the market.

*RC-IGBT: Acronym for reverse conducting insulated gate bipolar transistor. An RC-IGBT arranges two types of semiconductors with differing functions—IGBTs and freewheeling diodes (FWDs)—alternately in a straight line on a single chip. This permits much greater miniaturization compared with arranging the IGBTs and FWDs on two separate chips.

Industrial power semiconductors: Expanding sales of 7th-generation IGBT modules

In fiscal 2020, we posted a year-on-year increase in sales, boosted by higher demand for 7th-generation IGBT modules—which reduce losses by around 30% compared with existing chips and feature high heat dissipation and high reliability—mainly in the markets for renewable energy, factory automation, and air conditioners, centered on China. We also expanded our product lineup and started mass production of the X Series IGBT-IPM*. This module contributes to energy savings in equipment on which it is installed thanks to its industry-leading low-loss performance.

In fiscal 2021, we will strive to increase sales of 7th-generation IGBT modules mainly in the Chinese renewable energy, factory automation, and air conditioner markets, where demand remains strong.

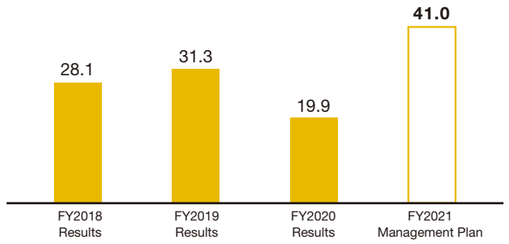
*7th-generation IGBT module equipped with IGBT driving circuits and a self-protection function to prevent failures due to overcurrent, overheating, etc.

Accelerating increase in production capacity and promoting development of next-generation products

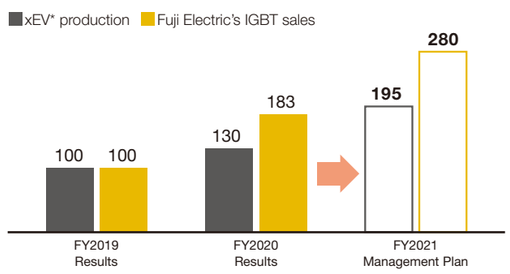
For the manufacturing process of power semiconductor chips, we are making continuous investments to increase the production capacity for 8-inch wafers. For the assembly process, we are investing to increase the production capacity for automotive and industrial products.

We are also emphasizing technological and product development of next-generation IGBT modules and SiC modules in order to strengthen the competitiveness of our power semiconductors.

Plant and Equipment Investment (Whole Segment)
(Billions of yen)

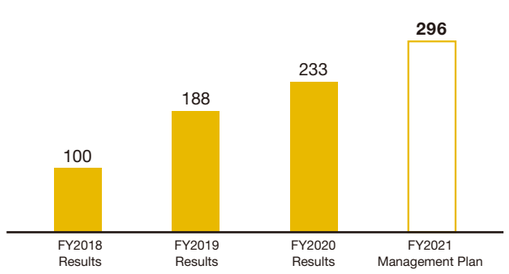


xEV Production Trend & Fuji Electric's IGBT Sales Plan



For both production and sales, FY2019 (benchmark year) is assigned 100 for comparison purposes
Figures for xEV production reflect our predictions based on research company forecasts
*xEV: Sum of full-hybrid vehicles and electric vehicles (EVs)

8-Inch Wafer Production Capacity (Front-End Process)



For production capacity (year-end), FY2018 (benchmark year) is assigned 100 for comparison purposes