



Japan's Automotive Industry Development and Opportunities Under Net Zero Trend

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Net Zero and the Development of Electric Vehicle Industry

In October 2020, Japan declared “Net Zero Emission by 2050” as its commitment to combat global warming. In April 2021, Japan set a new target of 46% carbon reduction by 2030 at the United Nations COP26 climate conference, and proposed the “2050 Net Zero Emission Green Growth Strategy”. In October of the same year, the Kishida Cabinet took office and continued to promote the necessary restructuring as well as R&D and innovations of the society and industrial sector under the carbon reduction policy, to strengthen the Joint Crediting Mechanism (JCM) with various countries, and to commit international collaboration in Asian energy transformation, striving to achieve the goal of net-zero emissions by 2050. The Green Growth Strategy formulates support policies for the energy industry, transportation manufacturing, and household life.

Japan's non-electricity sector emits the most carbon in the transportation sector, with carbon emissions amounting to 200 million tons, more than 80% of which comes from vehicle emissions. The net-zero policy is implemented by Japan Ministry of Economy, Trade and Industry (METI), the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) as well as the Ministry of the Environment (MOE). METI's Green Growth Strategy, which was released on June 18, 2021, specifies that the sale of fossil fuel vehicles will be banned by 2035. Compared to Europe, where only electric vehicles can be sold, Japan can still sell hybrid electric vehicles (HEVs), plug-in hybrid electric vehicles (PHEVs), and fuel cell vehicles (FCVs) in addition to electric vehicles (EVs), and the policy provides support for research and development of related technologies, including energy storage batteries, hydrogen/ammonia fuel energy research and development, and so on. METI is also responsible for the implementation of policies on the installation of charging stations/hydrogen

fueling stations, subsidy measures to promote the development of EVs, and the increase of subsidies for EVs.

Under the net-zero emission target, the EU and the U.S. have formulated stringent Corporate Average Fuel Economy Standards (CAFE), constricting the room for survival of fuel vehicles. Plus, the market share of electric vehicles has risen sharply from 2.5% in 2019, 4.5% in 2020, to 10% in 2021. From January to September 2022, fuel vehicle sales dropped by 4%, but the number of electric vehicle sales increased by 80%. The trend of market expansion has led European and American automobile manufacturers to invest in the electric vehicle market.

With the room for survival of fuel vehicles rapidly shrinking and the rapid expansion of the electric vehicle market, the Japanese government and Japanese car makers have begun to adjust their strategies to cope with the situation. For example: (1) Toyota, which regards electric vehicles as a “transitional technology”, plans to use the e-TNGA modularized platform starting from 2021 to invest 8 trillion yens (about 70 billion U.S. dollars) by 2030 to develop 30 pure electric vehicle (BEV) models; (2) Japan's Nissan, Mitsubishi, and France's Renault are scheduled to invest 3 trillion yens, with the goal of launching 35 new EV models by 2030; (3) Consumer electronics and motor makers Sony

and Honda are collaborating to develop VISION-S EV platform, with the expectation of launching new EV models by 2025.

Automobiles are an Important Manufacturing Industry in Japan

According to the Cabinet's statistics, in 2022, the production value of Japan's automotive industry accounted for 18.9% of the overall manufacturing GDP, slightly higher than Germany's 18.3%, lower than South Korea's 25.4%. Japan's manufacturing industry has not changed much compared to a decade ago, consisting mostly of automobiles and their components, industrial robots, semiconductors and machine tools. The automobile industry, for example, directly and indirectly employs 5.52 million people, accounting for 8.3% of Japan's total workforce. The automobile and parts manufacturing industry is Japan's core industry. **Due to the global shortage of chips, the Japanese automobile industry produced 7.83 million vehicles of all types in 2022, including 6.56 million passenger cars and 1.27 million commercial vehicles. The export value reached 140.6 billion U.S. dollars (179,970 billion yens), including 85.5 billion U.S. dollars (10,945.3 billion yens) for complete vehicles industry and 55.1 billion U.S. dollars (70,517 billion yens) for parts and components industry. In addition to supplying the domestic market, the automobiles and components industry is an important export sector for Japan.**

Driven by international and domestic trends and pressures, Japan's manufacturing industry is undergoing massive and structural changes. Japan's electrification is extremely slow, and according to Japan Automobile Manufacturers Association (JAMA), in 2022, 34.2% of new vehicle sales were for hybrid vehicles, and only 0.5% were for purely electric vehicles, which is different from current international trends. The Climate Group's report points out that if Japan fails to convert its new vehicles to 100% EVs by 2030, it could lose half of the global automotive market, resulting in the loss of 1.72 million jobs, a profit loss of about US\$6 billion in 2040, and a loss of 14.4% of GDP momentum. These trends have also triggered the Japanese government and industry to actively seek policies and industrial strategies to stimulate the development of EVs.

With the shortage of automotive chips and Japan's attempts to improve its core technological competitiveness, Japan has gradually strengthened its investment in the semiconductor industry, announcing the collaboration between TSMC and University of Tokyo in semiconductor research. The Japanese government will promote semiconductor investment valued more than 700 billion yens in November 2021, which includes 400 billion yens of subsidies for TSMC's establishment of factories in Japan. **Table 1** shows Japan's overall economy and automobile industry.

Table 1. Japan's Overall Economy and Automobile Industry

Items	2020	2021	2022	2023(e)	2024(f)
GDP(USD)	4.7 trillion	5.2 trillion	5.6 trillion	6.4 trillion	6.7 trillion
GDP Growth(%)	-4.5	1.7	2.0	2.3	1.5
Investment-to-GDP Ratio (%)	25.0	25.2	25.3	25.2	25.2
Population (Million)	125.6	125.4	124.8	124.7	124.4
Per Capita Income (USD)	39,890	44,571	45,884	51,809	53,667
Automotive Industry Workforce (Per 10,000 People)	546	547	552	546	548
Vehicle Ownership (Per 10,000 Vehicles)	7,846	8,352	8,620	8,955	9,343

Source: Industrial Technology Research Institute (ITRI) (2023/07)

Japan's Automobile Industry, Production and Sales

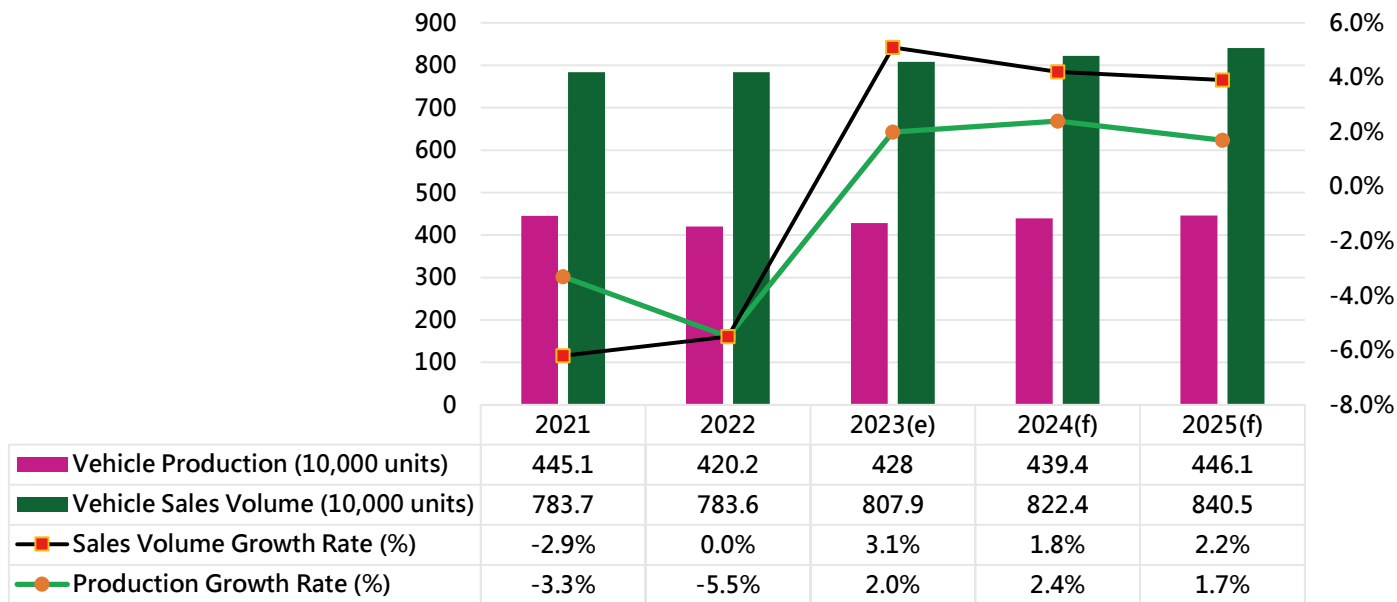
In 2022, due to the continuing impact of chip shortage coupled with the spread of COVID, the stagnant supply of spare parts affects the performance of factory sales. Take Toyota Japan for instance, all 14 domestic plants containing 28 production lines, and 2 plants containing 3 production lines ceased production for several days because of chip shortage. Its 2022 sales growth rate fell by 5.5%, still maintaining the scale of 4.202 million vehicles, but showed two consecutive years of sales recession. The top three best selling car models are Honda-N BOX (202,000 vehicles), Daihatsu-Hijet (185,000 vehicles) and Toyota-Roomy (109,000 vehicles).

Japan Automobile Dealers Association (JADA) and Japan Mini Vehicles Association (JMVA) released the statistics for 2023 showing that the first quarter chips shortages have improved, and the supply of new vehicles is gradually stabilizing. Japan had 20.3% growth in domestic new vehicle sales in February 2023 compared to the same month in 2022; Out of Toyota's 28 production lines at all 14 plants in Japan, only 1 production line of 1 plant was shut down in March. Sales in 2023 grew by 2.0%, and the market rebounded to 4.28 million units, reducing continuous sales decline. **Figure 1** shows the forecast of Japan's automobile sales market from 2021 to 2025.

Japan's passenger car sales in 2022 were 3.449 million units, a decline of 6.2% compared with 3.674 million units in 2021, and down 0.5% in product share compared with 2021. The standard passenger car sales in 2022 declined 6.9%, small passenger car sales in 2022 declined 8.0% in 2021, and the mini passenger car sales in 2022 declined 3.9%.

Japan's overall commercial vehicle sales were 748,000 units in 2022, a decline of 2.4% compared to 2021, but accounted for a 0.6% growth compared to 2021. The standard commercial vehicle sales in 2022 fell 22.3% compared to 2021, small commercial vehicle sales declined by 8.5% compared to 2021, and the mini commercial vehicle sales grew by 9.7% compared to 2021. Sales of mini-commercial vehicles contributed to the overall growth in the share of commercial vehicles. In 2022, Japan's

Fig. 1. Japan's Automobile Production and Sales Forecast



Source: JAMA, Industrial Technology Research Institute (July 2023)

bus sales were 0.4 million vehicles, a decline of 21.7% from 2021, and a decline of 0.1% in terms of market share. The sales volume of large buses grew 0.2% from 2021. The sales volume of small buses declined 26.9%. **Figure 2** shows the analysis of Japan's automobile sales by product.

In 2022, Japan's automobile market ranking remained the same as in 2021, with local brands still dominating the market. Toyota, Honda, Suzuki, Nissan, Daihatsu, Mazda, Subaru, Mitsubishi among other brands accounted for 90.3% of the total market share, up 1.1% from 89.3% in 2021. In 2022, Toyota, the No. 1 brand in terms of market share, saw a 14.1% decline in sales landing at 1.06 million passenger cars, a 1.2% decline in sales of the commercial vehicle segment, and a 28.7% decline in sales of the bus segment, resulting in an overall sales volume of 1.248 million, a decrease of 12.3% compared to 2021, with a 2.3% decline in market share.

Suzuki in the second place sold 479,000 vehicles of passenger cars, down 3.6% compared to 2021. Its commercial vehicle sales volume was 124,000 vehicles in 2022, an increase of 11.0% compared to 2021, rendering the brand's overall sales volume at 603,000 vehicles, a decline of 0.9% compared to 2021, and the market share grew by 0.6% compared to 2020. Daihatsu at the third place sold 390,000 passenger cars, a declined by 7.1% compared to 2021, but its commercial vehicle sales volume increased by 21.7%. The overall sales volume was 576,000 units, an increase of 0.6% compared to 2021, driving the market share to increase by 0.8%, surpassing Honda. **Figure 3** is the Japanese automobile manufacturers' market share analysis.

In 2022, Japan Auto Parts Industries Association (JAPIA) with 442 members announced that 102 major Japanese automotive parts manufacturers totaled a

Fig.2. Japan's Automobile Sales by Product (4.2 Million Vehicles Sold in 2022)

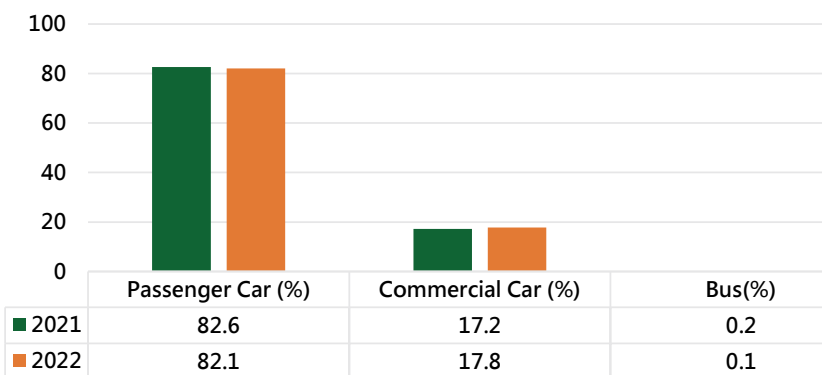
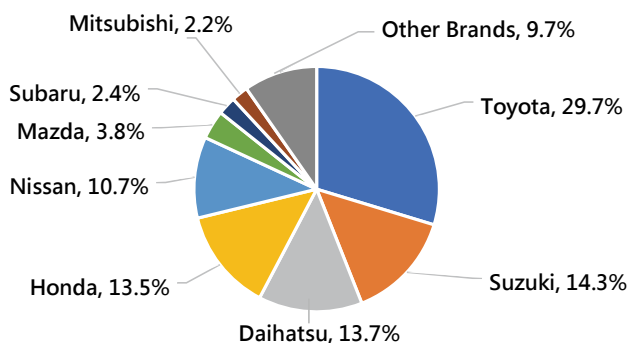


Figure 3. Japanese Automobile Manufacturer's Market Share Analysis

Sales Share of Japanese Automobile Brands in 2022



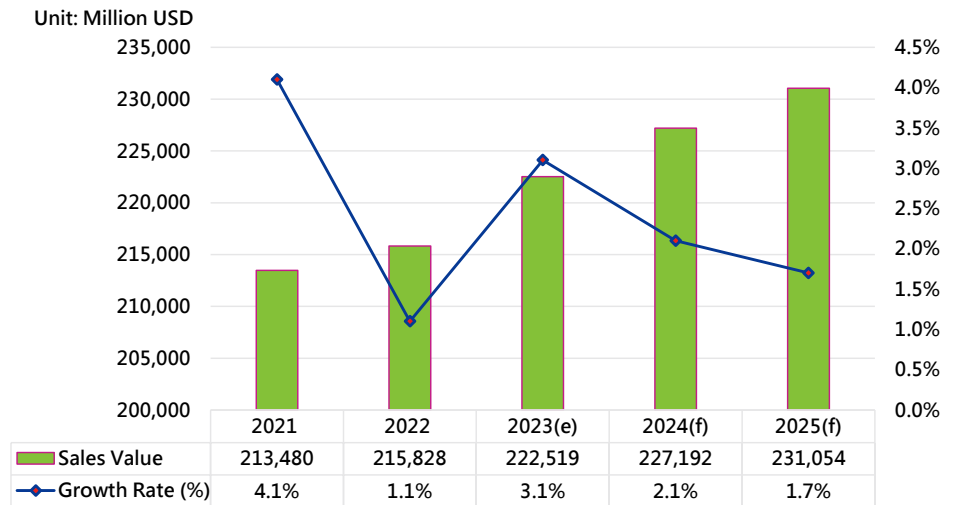
Source: JAMA, Industrial Technology Research Institute (July 2023)

sales value of 215.83 billion U.S. dollars in 2022, up 1.1% from 2021. Most of the automotive parts and components in Japan are mostly supplied to the Japanese domestic OEM assembly, accounting for 73.2% of the production of automotive parts and components, and 7.7% of the maintenance market, followed by the supply to domestic and foreign automotive bodywork which accounts for 19.1%. **In the first half of 2023, Japan lifted its border restrictions and resumed normal economic activities, and led manufacturers to deploy in emerging countries to increase and coordinate the number of automotive components in stock. The automotive components market in 2023 reached US\$222.52 billion, a growth of 3.1% over the same period in 2022. Figure 4 shows the forecast of Japan's auto parts sales value from 2021 to 2025.**

In 2022, Japan's automotive parts and components exports were valued at US\$55.17 billion, an increase of 2.1% over 2021, of which US\$15.12 billion (27.4%) was exported to the U.S., followed by US\$9.93 billion (18.0%) to China, US\$4.91 billion (8.9%) to Thailand, US\$2.81 billion (5.1%) to Indonesia, and US\$2.65 billion (4.8%) to Mexico, with the top 5 exporting countries accounting for 64.2% of the total. The main exported items were, in order, other automotive parts and components accounting for 61.8%, pistons and connecting rods and their parts and components (12.8%), electrical parts and components (6.2%), automotive tires (4.7%), and automotive lamps (3.6%), etc. The top 5 exported parts and components accounted for 89.1% of the total.

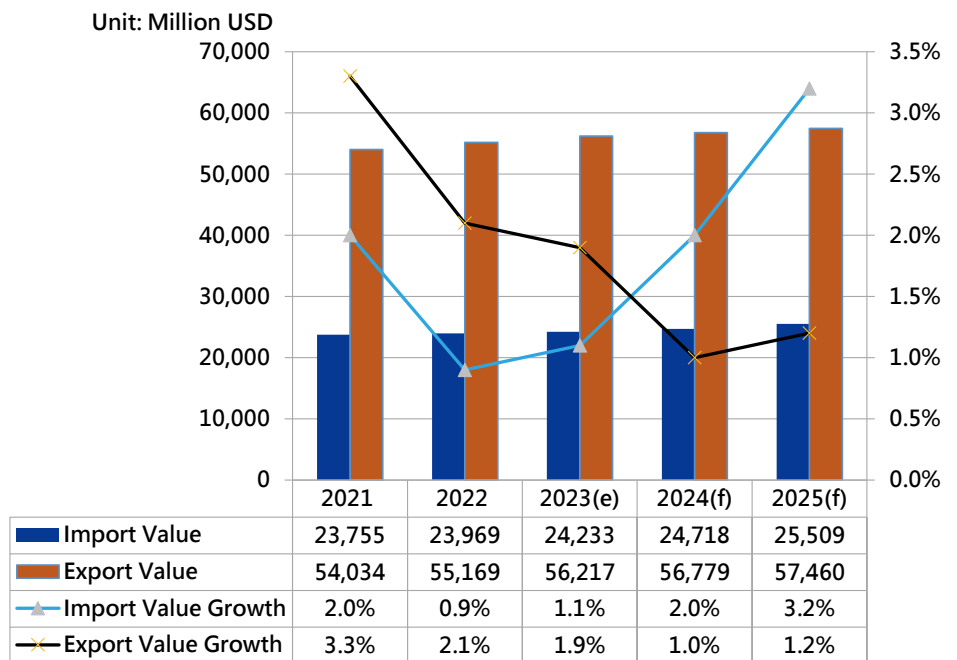
In 2022, Japan's automotive parts import value was 23.97 billion U.S. dollars. Automotive parts imported from China were 7.67 billion U.S. dollars (accounting for 32.0%), followed by Vietnam at 2.66 billion U.S. dollars (11.1%), Thailand at 2.49 billion U.S. dollars (10.4%), the United States at 1.68 billion U.S. dollars (7.0%), and Indonesia at 1.46 billion U.S. dollars (6.1%). The top five countries accounted for 66.6%. The main imported components, in order, were other automotive

Figure 4. Japan's Auto Parts Sales Value from 2021 to 2025



Source: JAMA, Industrial Technology Research Institute (July 2023)

Fig. 5. Japan's Import and Export of Automotive Components

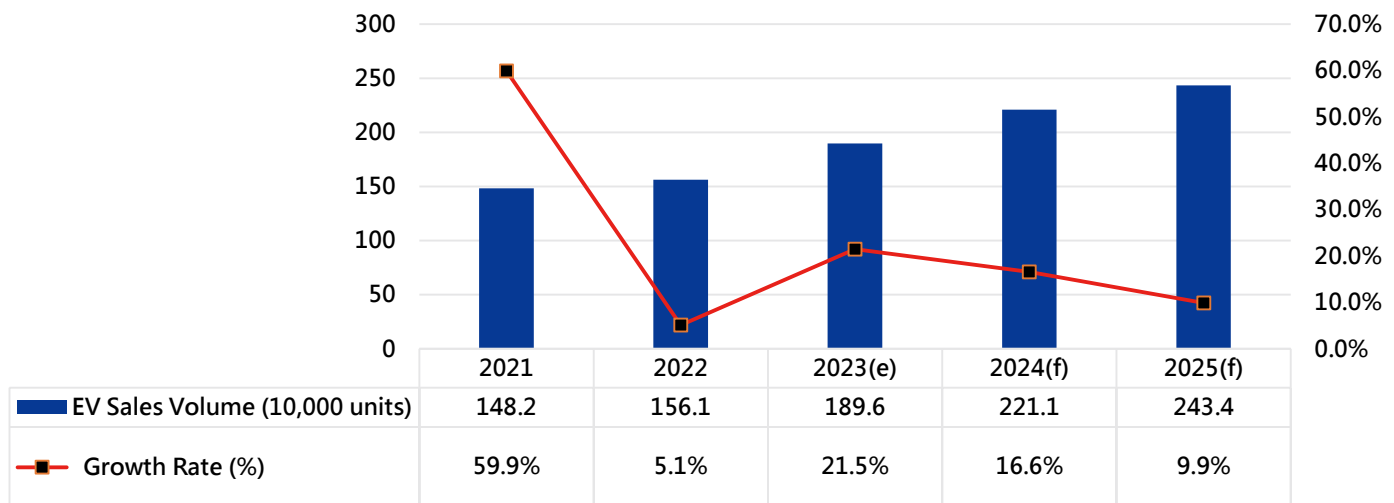


Source: JAMA, Industrial Technology Research Institute (July 2023)

components accounting for 39.1%, electrical and wiring components (20.3%), pistons and connecting rods and their components (12.1%), automotive rims (5.0%) and automotive lamps (4.2%). The top 5 imported components accounted for 80.7%. **Figure 5** is the analysis of Japan's import and export of automotive components.

In 2022, the overall sales of electric vehicles in Japan were 1.558 million vehicles, an increase of 5.1% from 1.482 million vehicles in 2021. Among the types of electric vehicles, Hybrid Electric Vehicle (HEV) were the main force, with sales of 1.466 million vehicles in 2022, an increase of 1.8% compared with the sales volume of 1.44 million units in 2021, and accounting for 94.1% of the total market share, down 3.1% from 97.2% in 2021. Battery Electric Vehicle (BEV) is the second largest market segment, with sales of 54,000 vehicles in 2022, a 217.6% increase from 17,000 vehicles in 2021, and a market share of 3.5%, a 2.3% increase from 1.2% in 2021. The reason for the downturn in the sales of BEVs as compared to that of

Fig. 6. Forecast of Electric Vehicle Sales in Japan



Source: JAMA, Industrial Technology Research Institute (July 2023)

hybrid vehicles is related to the penetration rate of charging infrastructure.

The third largest category is Plug-in Hybrid Electric Vehicle (PHEV), with the sales volume of 37,000 vehicles in 2022 growing 60.8% from 23,000 vehicles in 2021, and market share of 2.4%, up 0.9% from 1.6% in 2021. Fuel Cell Electric Vehicle (FCEV) sales were 845 vehicles, down 65.4% from 2021. **Figure 6** is the sales from 2021 to 2025.

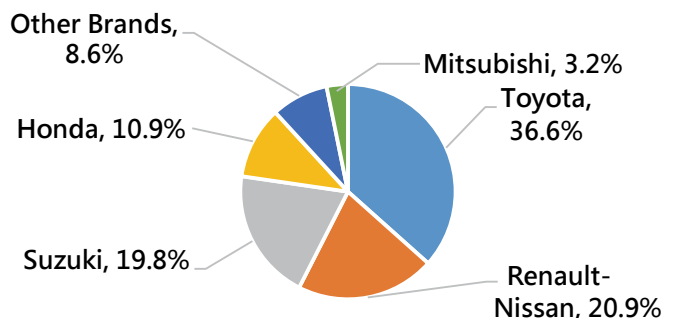
Toyota is the top EV seller in Japan, with sales of 570,000 vehicles in 2022, a 2.5% increase from 556,000 vehicles in 2021, and a market share of 36.6%, a 0.9% decline from 37.5% in 2021. The top three best-selling models were Aqua (Prius C) (72,000 vehicles), Corolla (53,000 vehicles), Yaris (49,000 vehicles). Renault-Nissan, the second largest in terms of market share, sold 326,000 vehicles in 2022, an increase of 8.2% from the 301,000 vehicles sold in 2021, with a market share of 20.9%, up 0.6% from 20.3% in 2021, surpassing Suzuki in terms of market share. The top three best-selling EVs models were Rook (73,000 vehicles), the Note (68,000 vehicles), the Serena (54,000 vehicles), and the Nissan. Rook (73,000 vehicles), Note (68,000 vehicles), and Serena (54,000 vehicles).

In 2022, Suzuki in the third place were 308,000 vehicles, a decline of 5.0% from 2021 sales of 325,000 vehicles, and a market share of 19.8% declining 2.1% from 2021. The top three best-selling models were Suzuki Spacia (100,000 vehicles), Huster (70,000 vehicles) and Wagon R (64,000 vehicles). **Figure 7** analyzes the sales share of EVs in Japan.

Conclusion

Looking forward to the future development trend, **Japan has set up the goal of automobile industry transformation, and in 2030, its sales of “new generation vehicles” must reach 50%~70%, of which BEV and PHEV must account for 20%~30%.** Toyota, Nissan, Mitsui Metals and other automobile factories and enterprises are actively investing in developing all-solid-state batteries (in the same space conditions, the mileage of all-solid-state batteries is about

Figure 7. Electric Vehicle Sales Share in Japan in 2022 (1.558 Million Vehicles)



Source: Marklines, Industrial Technology Research Institute (July 2023)

twice as long as that of the traditional lithium-ion batteries, reaching 500 kilometers). This will help improve the overall performance of electric vehicles in Japan and drive continuous growth in output value. **With the increase in the carbon reduction target for 2030 to 46% and the setting of a target for a ban on the sale of fuel vehicles in 2035, the electric vehicle market in Japan will continue to grow at a positive rate of 21.5% by 2023, and the market for electric vehicles in Japan has achieved a 21.5% growth in 2023 and will expand to the size of 1.893 million vehicles.**

Over the past decades, Taiwan’s automobile industry has had a very close relationship with Japan, and has been engaged in the OEM production, sales and maintenance of Japanese vehicles for a long time, which has resulted in a significant improvement in the quality, delivery and cost competitiveness of the whole vehicle assembly and spare parts. The leading Taiwanese manufacturers have entered the supply chain of well-known EV brands (such as Tesla, etc.). In particular, automotive electronics and EV spare parts are mutually beneficial. In the trend of net-zero emission, Taiwanese manufacturers can capitalize on the competitive advantages of the industry and collaborate with Japanese manufacturers to seize business opportunities. □

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