



Key Innovative Industries in Taiwan

Next-Generation Vehicle



Information
Security

**Next-Generation
Vehicle**

Communications
Industry

Internet
of Things

Semiconductor
Industry

Biopharmacy
Industry

Smart
Machinery

Circular
Economy

Green
Energy

Service
Industry

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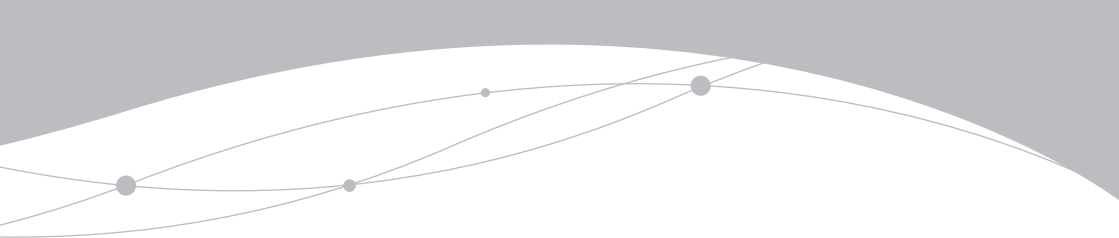
Policy Initiatives

Mercedes-Benz, the well-known international car maker, defined the four core principles of "C.A.S.E." as its development strategy in 2016. C stands for Connected, A stands for Autonomous, S stands for Shared & Services, and E stands for Electric. Many other car makers subsequently adopted C.A.S.E. as their guide for next-generation development in the car industry.

Every aspect of C.A.S.E. is now under development in Taiwan. For the Electric aspect, the government established smart electric vehicle plans in 2015 and adopted five main strategies including "promoting electric buses through cooperation between different government agencies", "increasing incentives for automobile purchases", "innovating business models", "encouraging business investments", and "establishing an industry value chain" to increase the number of electric vehicles on the road and power the upgrade of the smart electric vehicle industry.

Taiwan also introduced more aggressive actions and improvement targets for air pollution management in the interests of public health. The "Air Pollution Control Action Plan" released in 2017 set a goal of halving air pollution by 2019. EVs will also be progressively introduced with the goal of electrifying all government vehicles and public buses by 2030.

For the Autonomous aspect, the short-term goal is the refinement of Advanced Driver Assistance Systems (ADAS) and related regulations to improve the safety of road users, followed by the development of self-driving vehicles. To keep pace with international developments in self-driving vehicles, the "Unmanned Vehicles Technology Innovative Experimentation Act" was passed by Taiwan in 2018. The law draws on the spirit of the regulatory sandbox to provide a legal basis for the experimentation of unmanned vehicles. The law facilitates the development of next-generation automotive technologies and applications by allowing industry, academic and research institutes in Taiwan to engage in innovative experimentation of self-driving technologies, services and business models in the open-world.



The current closed-course self-driving vehicle demonstration facility in Taiwan include: (1) The "Taiwan CAR Lab" in Tainan has an area of 1.8 hectares site and it is the first closed-course self-driving vehicle demonstration facility in Taiwan. It is mainly designed for tests of vehicles smaller than medium-sized buses and simulation of low-speed driving less than 30km/hr under domestic road conditions. It allows operators to test and demonstrate their products and the general public to try out and learn about technology. (2) Phase 1 of the Hutoushan Innovation Hub in Taoyuan has an area of 1.8 hectares and includes the smart driving vehicle and information security IoT centers. It provides self-driving simulation environment for multiple settings.

Specific successful cases include the creation of "Winbus", the first self-driving electric minibus in Taiwan, by the Automotive Research & Testing Center (ARTC) along with 18 companies. The Winbus was launched at the Ministry of Economic Affairs in August 2019 and it is a level 4 unmanned vehicle with a maximum speed of 50km/h and a single cruising range of 70km. Winbus obtained the first test license plate in Taiwan permitted under the "Unmanned Vehicles Technology Innovative Experimentation Act" in October 2019. It assisted the operator in launching the one-year tests in the "Changbin and Lugang Self-Driving Bus Tourism Shuttle Program" in March 2020. It has completed two months of operations without passengers in phase 1 and it officially started phase 2 trial passenger services in mid-July 2020. After phase 2, it will begin flexible dispatch and shuttle operation commercialization test and certification in phase 3. The goal is to achieve commercialization and mass production in the future.



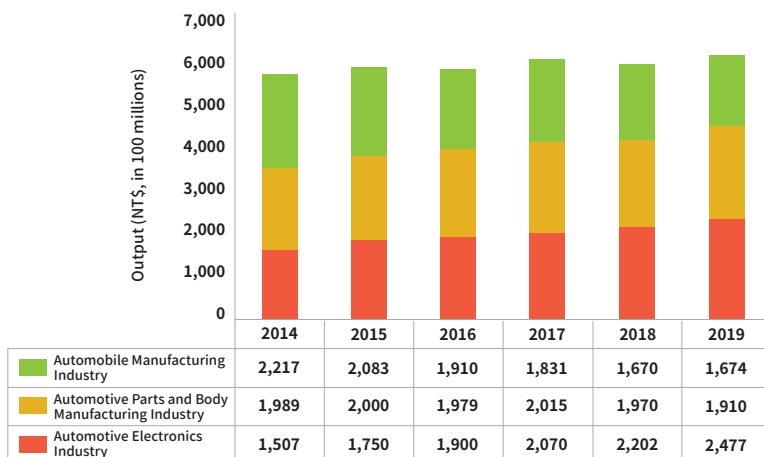


Overview of Industrial Development

1 | Output Value |

The automotive industry in Taiwan has accumulated decades of experience in traditional car manufacturing. A complete automotive industry supply chain has also taken shape in Taiwan thanks to long-term cooperation between car makers and suppliers. As vehicle developments shift toward smart applications and electric vehicles, Taiwan's automotive electronics companies have also made use of their advantages and gradually became a part of the supply chain for international automobile manufacturers. In 2019, the "Automobile Manufacturing Industry" in Taiwan had an output value of NT\$167.4 billion, the "Automotive Parts and Body Manufacturing Industry" was worth NT\$191 billion, and the "Automotive Electronics Industry" had an output value of NT\$247.7 billion. The three industries therefore have a combined output value of NT\$606.1 billion (refer to Figure 1). The "Automotive Electronics Industry" has become the main driver of growth in Taiwan's automobile industry in recent years.

In terms of product category, small sedans (under 2,000 c.c.) were the main type of vehicles produced in Taiwan while manufacturing of automotive parts and components consisted mainly of car lights, bumpers, rear view mirrors, wheel rims and body bumper parts. Taiwan's automotive parts are sold not only in the domestic market, but also exported in large quantities to North America, European Union and other markets. In addition to being a key player in the After-Market (AM) and Original Equipment Manufacturing (OEM) markets, some manufacturers have broken into the supply chain of international car makers (e.g. Tesla, Ford) as well. The entry of Taiwan's ICT and other related industries into the automotive electronics, self-driving technology, new energy, and other sectors against such a backdrop means that all the basic conditions for the development of next-generation vehicles are present in Taiwan.



Note: The production value of the automotive electronics industry in 2019 is an estimated value.

Source: Statistics for the automobile manufacturing industry and automotive parts and body manufacturing industry are from the Department of Statistics, Ministry of Economic Affairs. The statistics on automotive electronics are from the Industry, Science and Technology International Strategy Center (IEK), ITRI.

Figure 1 Production Value of Taiwan's Automobile Industry in 2014-2019

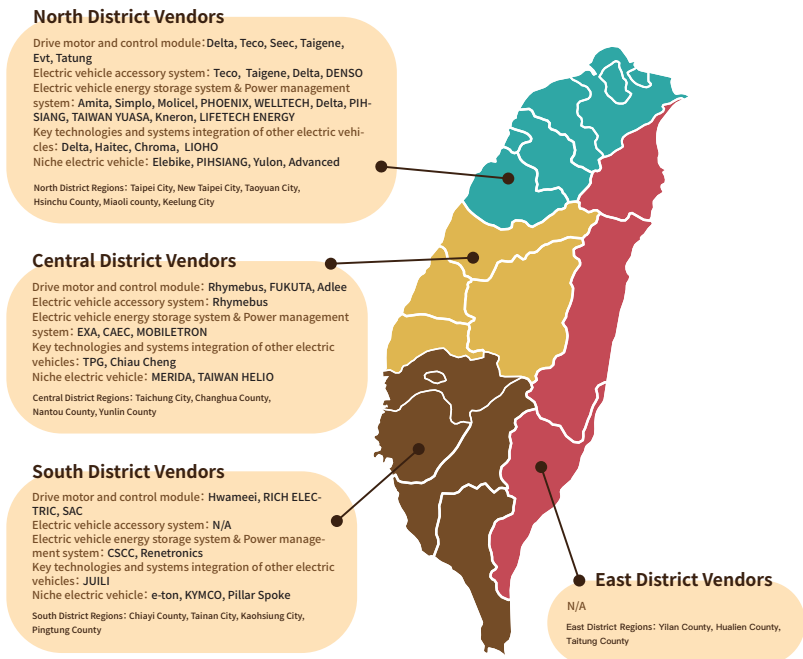
2 | Industrial Clusters |

1. Northern Taiwan

The northern cluster with its complete industry chain is the home base of the automotive industry. Including whole vehicle makers such as Gogoro, Sanyang Motor, Yulon Motor, CMC, RAC, Ford Lio Ho, and Kuozui, vehicle body makers such as Sin Sheng manufacturers of servo motors and control modules, EV auxiliary systems, EV energy storage and power management systems, other critical EV technologies and system integration, and niche EVs¹ such as

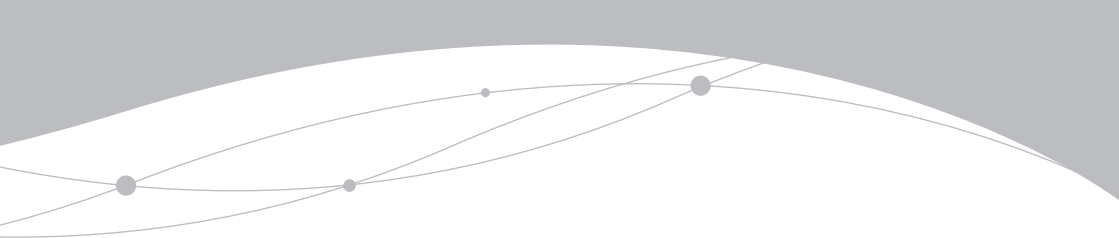
¹ Niche EVs are EV models designed for specific market segments and are characterized by their variety, personalization, customization, and modular power packages. Electric pallet trucks, electric dune buggies, electric forklifts and electric golf cars all under the niche EV category.

E-One Moli Energy, Delta Electronics, and Haitec, as well as suppliers of anode materials for lithium-ion batteries of electric vehicles such as Formosa Lithium Iron Oxide Corp., Chang Chun Petrochemical, CoreMax, and Mechema. These companies are distributed across Taipei City, New Taipei City, Taoyuan City, Hsinchu City/County and Miaoli County (see Fig. 2).



Source: Industry, Science and Technology International Strategy Center, ITRI.

Figure 2 Taiwan's Green EV Industry Cluster

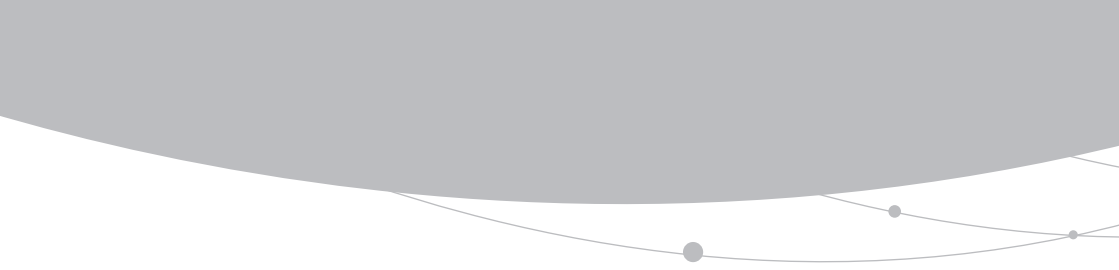


Founded in 2011, Gogoro specializes in the development of smart electric motorcycles, smart energy, and smart battery exchange service systems. It is the leader in electronic scooters in Taiwan. It has sold more than 32,356 vehicles as of the end of June 2020 and has a market share of approximately 83.7% in Taiwan. Gogoro actively promotes the battery exchange model and has set up more than 1,600 GoStation® battery exchange stations in Taiwan so far.

Yulon Motor was founded in 1953 and its key subsidiaries include Yulon-Nissan, Luxgen and Car-Plus car rentals. The company has focused its efforts on transitioning from a conventional manufacturer to a manufacturing service provider in recent years. Yulon plans to expand its existing business system to create a service system that serves all car brands. It is also cooperating with government policies by investing in the development of smart vehicles that integrated the IT and automobile industry. In addition to boosting the international competitiveness of the automobile industry, Yulon will also assist the IT industry to enter the electronic automotive parts market and boost the competitive advantage of the Taiwanese automobile industry.

E-One Moli Energy was founded in 1998 and it is committed to the development of rechargeable lithium-ion MOLICEL® battery cells. It is the only producer of pillar-shaped lithium nickel cobalt aluminum (NCA) batteries in Taiwan. It mainly develops and produces high-power batteries for appliance manufacturers (Dyson).

Delta Electronics was established in 1971 and its three key portfolios are power supplies and components, automation and infrastructure equipment. For power supplies and components, Delta is a provider of electric power systems and critical components for EVs and hybrid vehicles. These include high-efficiency onboard chargers and DC/DC converters. For infrastructure equipment, Delta supplies the DC fast chargers, AC chargers and charging station management systems used by EV charging facilities. The supplied equipment passed safety and standards certification in the EU, US, China and Taiwan.



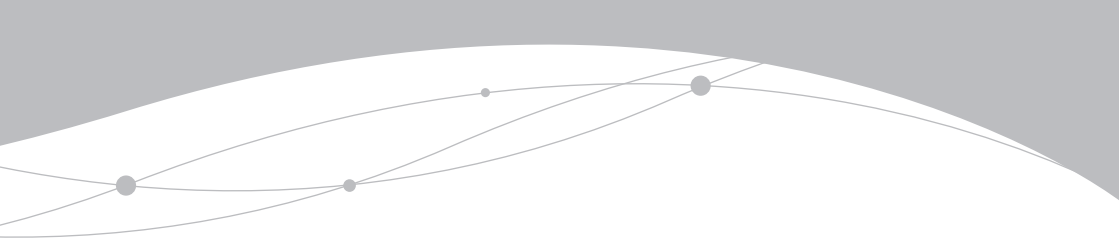
Formosa Lithium Iron Oxide Corp. was established in 2008 and it is committed to the development, production, and sales of anode materials for lithium iron phosphate (LFP) batteries. It has a monthly capacity of 400 tons and it is the main supplier of LFP battery materials in the world. The LFP batteries produced with its materials have been commercialized and widely used in energy storage batteries in electric vehicles, solar energy, wind power, and uninterruptible power supply (UPS) systems.

ICT companies in Taiwan have now taken an active interest in electric self-driving vehicles and automotive electronics. Acer, Asus, and Lite-on are some of the most representative ICT companies in the automotive electronics sector. Acer was established in 1976 and is a well-known Taiwanese tech company. It has been actively positioning itself in the self-driving market in recent years by cooperating with Yulon, the local EV maker, to develop Taiwan's first self-driving EV concept. The move takes the company beyond ADAS into the unmanned self-driving sector.

In addition, a new entrant in Taiwan has also successfully developed a battery and power system for electric vehicles. XING Mobility was established in 2015 and it has immersion-cooled battery pack technologies and patents. It employs high-density modular designs to achieve efficient heat dissipation and cooling which significantly reduces the volume and weight of the batteries. It provides flexible combinations for spatial and power requirements of different vehicle models. The battery modules are suitable for the shapes and dimensions of all types of vehicles and they greatly reduce the time and cost of the development of specific vehicles. They have been used in electric supercars, electric trucks, and conversion of traditional petrol antique cars to electric cars.

2. Central Taiwan

The central cluster is spread across Taichung City, Changhua County, Nantou County and Yunlin County. Central Taiwan has traditionally been the heart of Taiwan's precision machinery industry so it includes manufacturers for servo



motors and control modules, EV auxiliary systems, EV energy storage and power management systems, other critical EV technologies and system integration, and niche EVs. An example of these companies is Mobiletron.

Mobiletron was founded in 1982 and distributes automotive electronic parts and components under the "MOBILETRON" brand. Key products including electronic engine control systems and vehicle safety systems. To enter the EV market, Mobiletron focused on the development of EV energy storage and battery management systems. It also invested in RAC for the production of electric vehicles and the three key EV systems (battery, electro-mechanical and electronic control); a joint R&D project for self-driving medium buses was also set up with ITRI with the goal of developing new models for mass production.

3. Southern Taiwan

Southern cluster contains well-known whole vehicle makers such as Master Transportation Bus Manufacturing (electric bus manufacturer), and KYMCO (motorcycle maker). Vendors for EV parts and components encompass servo motors and control modules, EV energy storage and power management systems, other critical EV technologies and system integration, and niche EVs. Companies that specialize in structural parts of electric vehicles include Honley Auto. Parts (hot stamping automotive body components), and suppliers of cathode materials for lithium-ion batteries of electric vehicles (e.g., China Steel Chemical Corp. and Yonyu Applied Technology Material). These companies are spread throughout Chiayi City/County, Tainan City, Kaohsiung City and Pingtung County.

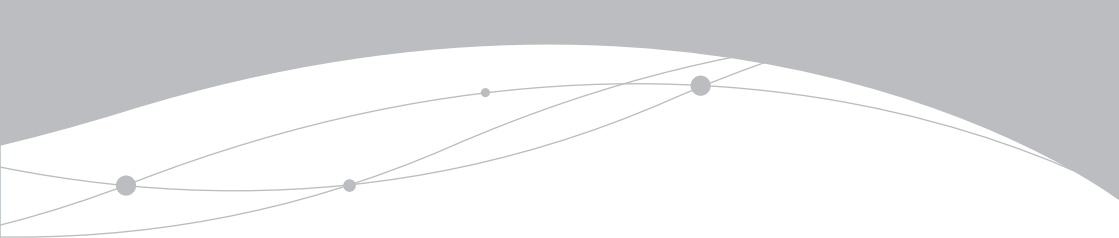
Honley Auto. Parts was founded in 2014 and its main products are hot stamping automotive body and structural products (e.g., A/B-pillars, anti-intrusion bars on doors, bumpers, roof rails, and rockers) and the assembly and production of their application products. Hot stamping parts are simple, lightweight, and safe which satisfy the requirements for lightweight and safety of electric vehicles.

Potential Investment and Collaboration Opportunities in Taiwan

1

Best R&D and testing facility for next-generation vehicles

Taiwan is densely populated and has a very complex transportation environment. Road traffic is a mix of pedestrians, motorcycles and automobiles compounded by a population where the use of ICT products in everyday life is very common. In the embracing "C.A.S.E." as the direction for next-generation development, international cooperation can be used by Taiwan in every aspect to enhance the technical capabilities of the industry and make up for its deficiencies. Taiwan is also well-suited to become a demonstration facility for next-generation vehicles through new business models based on inter-disciplinary cooperation, and pilot trials for new energy vehicles. In smart driving for example, Taiwan's more complicated driving environment makes it a more suitable testing environment for the development of autonomous vehicles than other countries that are now doing the same. The passing of the "Unmanned Vehicles Technology Innovative Experimentation Act" will also pave the way for self-driving facilities that will encourage foreign companies choose Taiwan for product development and real-world testing.



Demand for IoV will only grow even bigger in response to developments in EV and self-driving vehicles, as well as continue upgrading in automotive electronics technology. Protection of information security then becomes an issue of great importance. Despite the massive market opportunities and development resources possessed by China, as long as the US-China trade war continues to rage the U.S. Government will be quite sensitive to information security issues. Taiwan's extensive experience with information security technologies and protection makes it a more suitable partner for the development and testing of next-generation vehicles.

In addition, the ARTC in Taiwan has the most comprehensive electromagnetic compatibility (EMC) laboratory in Asia and is capable of administering electromagnetic interference and electromagnetic endurance tests for electric buses, cars, scooters, and components. The laboratory had been certified by institutions and vehicle manufacturers such as the American Association for Laboratory Accreditation (A2LA) GM, Ford, FCA, Fisker, Jaguar & Land Rover, and Harley-Davidson. It can provide direct assistance for obtaining an EMC test report with international certification. With the development of electric vehicles and IoV applications, more automobile components will be required to pass EMC certification. If companies choose to develop products in Taiwan, they will have access to efficient certification tests and product improvements.

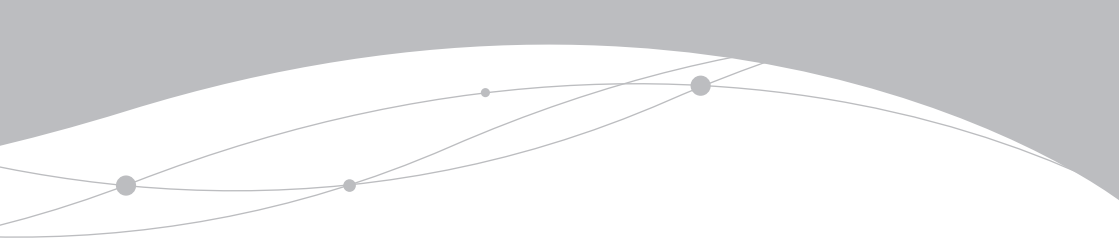


2

Connecting with Taiwan's ICT Industry to exploit next-generation vehicle opportunities

Next-generation vehicles cover a wide range of industries. EVs and self-driving vehicles are both waiting for breakthroughs in new technologies, so the threshold for R&D is quite high. Traditional car makers can't complete development on their own, and tech companies can't enter the automotive sector without help either. Emerging automotive companies in particular need to look for partners for cross-industry/sector cooperation or engage in multi-national technical cooperation in order to break into the emerging technologies sector. The ICT industry of Taiwan boasts world-class R&D capability and manufacturing expertise. Its many years of experiences in the automotive electronics industry have created a variety of applications for vehicle safety, mobility assistance, communications multimedia, and automotive IC. Its manufacturing capacity is strongly trusted by foreign and local vendors. Taiwan's supply chain has gradually established the production capacity for key components necessary for next-generation automobiles such as camera, radar, IoV communication modules, and other sensor/positioning products. Taiwanese companies have track records of shipments to international companies and other companies have invested in LiDAR and HD maps to strengthen market opportunities in system integration. Faced with a tidal wave of next-generation vehicles, consumers now expect more in terms of environmental protection and safety. Massive increases in demand for car sensing technology indicate that Taiwan can partner with international car makers in the development of next-generation vehicles.

Specific cases include the signing of a cooperation agreement between top-ten automobile manufacturer FCA and Taiwan's Foxconn Group. They plan to establish a joint venture dedicated to the development and production of electric vehicles and operation in the global IoV industry. The goal is to accelerate the entry into key automobile component and software and hardware integration. The Taiwanese partner shall be responsible for the production of key components and the supply of innovative software integration service development. Furthermore,



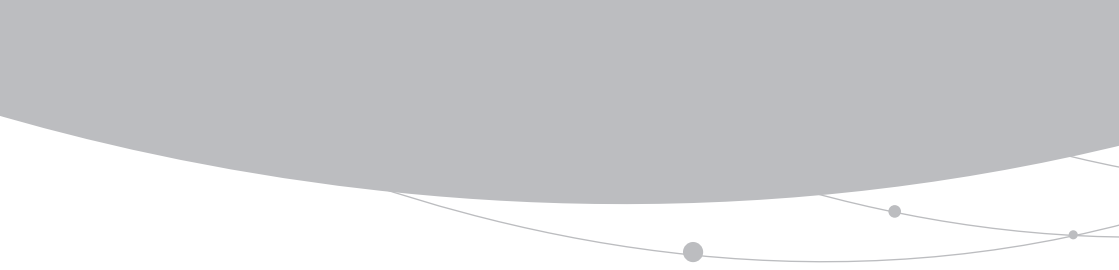
the largest transmission system supplier GKN Automotive works with the Taiwanese company Delta Electronics to jointly develop the transmission system used for electric vehicles. The goal is to launch a competitive eDrive system for mass production within three years. The integration of the motor, transmission, and motor controller can reduce cost, weight, and assembly requirements for automobile manufacturers.

3

Taiwan's whole vehicle and component manufacturing capabilities can provide international car makers with full range of production services

Taiwanese car makers have invested significant resources in the development and adjustment of production equipment. They are continuing to upgrade their overall manufacturing capabilities to meet emission standards. Some manufacturers have even taken the lead on investing in EV production technologies and have the capability to manufacture whole EVs. The relatively flexible production lines of the Taiwanese automobile industry can provide the full-range of manufacturing services for small lots of specialty vehicles making them a suitable pilot production partner for international car makers.

Taiwan's manufacturing capability for automotive parts and components is also of high standard. Taiwanese vendors have a strong pool of expertise on lithium-ion batteries, servo motors, reduction gears, energy storage systems, power control modules, power control systems, vehicle ICT system, and other technologies used by EV. A significant number of Taiwanese vendors now



supply EV parts and components to international car makers such as Tesla and BMW's Mini-E, proof that Taiwanese parts suppliers have achieved international acceptance. In addition, Taiwan also produces anode and cathode materials for lithium-ion batteries. The anode material can be used for LFP, NMC, cobalt sulfate, and nickel sulfate batteries. Future developments in next-generation vehicle technology should see Taiwanese parts suppliers leverage their exceptional R&D capability to continue supplying international car makers with the necessary products to satisfy the demands of new technologies and fields.

Due to the recent impact of the COVID-19 epidemic, operations in many automobile component and vehicle plants in Mainland China, Europe, and the Americas have been suspended. The suspension illustrates the necessity of the creation of a secure supply chain for the international automobile industry and the dispersion of production bases will become an important trend. Taiwan can be used as one of the regional supply centers for international automobile manufacturers. Foreign companies can take advantage of the existing infrastructure of Taiwan's automobile, component, and ICT industry, and they can also disperse supply chain risks and create a regional production network centered in Taiwan to ensure their backup production site or supplies of major components.





Investment Incentive Measures

1 | Tax incentives |

Taiwan's profit-seeking enterprise income tax rate is 20%. To encourage foreign companies to invest in Taiwan, support industrial innovation, and promote industry-academia collaboration, foreign companies are eligible for the following preferential taxes (Table 1):

Table 1 Preferential taxes

Item	Incentives
R&D and introduction of technology or mechanical equipment	<ul style="list-style-type: none">• Up to 15% of the company's R&D expenditures may be deducted from its profit-seeking enterprise income tax for current year.• Royalty payments to foreign companies for imported new production technologies or products that use patents, copyrights, or other special rights owned by foreign companies is, with the approval of the Industrial Development Bureau, MOEA, exempt from the corporate income tax.• Imported machinery which local manufacturers cannot produce are eligible for duty-free treatment.

Item	Incentives
Investment in smart machinery / 5G	<ul style="list-style-type: none"> • Smart machinery: Automatically scheduled, flexible, or mixed-model production lines that utilize big data, AI, and IoT. • 5G: Related investment projects include 5G communication systems, and new hardware, software, technology, or technical services. • For investments of no less than NT\$1 million and no more than NT\$1 billion, either "5% of investment spending deducted from profit-seeking enterprise income tax (current FY)" or "3% of investment spending deducted from profit-seeking enterprise income tax, if total spending spread over three years" may be selected, but the total amount deducted may not exceed 30% of corporate income tax that year. • The applicable periods are January 1, 2019 through December 31, 2021 (smart machinery) and January 1, 2019 through December 31, 2022 (5G).
Technology investment / Stock-based employee compensation	<ul style="list-style-type: none"> • The worth of shares acquired through technology investment/stock-based employee compensation can be excluded from the taxable income for that year (up to NT\$5 million). In addition, those that meet related criteria are eligible for reduced taxes based on "acquisition price" or "transfer price," whichever is lower.
Foreign Special Professionals	<ul style="list-style-type: none"> • Foreign special professionals who meet criteria are eligible for a 50% deduction of total income tax for amounts exceeding NT\$3 million.
Setting up operations in industry parks	<ul style="list-style-type: none"> • Companies that set up operations in export processing zones, science industrial parks, or free trade ports are eligible for exemptions on import duties, commodity tax, and business tax for the import of machinery and equipment, ingredients, fuel, materials, and semi-finished products for their own use.
Others	<ul style="list-style-type: none"> • Companies that use undistributed earnings to engage in substantive investments may exclude the amount when calculating their profit-seeking enterprise income tax.



2 | Subsidies |

1.The Global R&D Innovation Partner Program

Some foreign companies have a high degree of complementarity with Taiwan's industries. To encourage them to engage in R&D and innovation activities in Taiwan, such companies, after gaining approval from the MOEA, will be eligible for subsidies of up to 50% of total R&D expenditures if they: (1) have technologies that are not yet mature in Taiwan or overseas, and could create strategic products, services, or industries over the course of future industrial development; (2) have potential to help Taiwan produce leading technologies or significantly enhance the competitiveness and increase the added value of important industries; or (3) engage in key and common technology R&D, vertical or horizontal technology integration, and can create an industrial value chain.

2.Integrated R&D Program

Companies, once approved by the MOEA, will be eligible for subsidies of no less than 40% but no more than 50% of total project funding if they: (1) engage in key and common technology R&D, vertical or horizontal technology integration, and can create an industrial value chain; (2) establish industry standards, protocols, or platforms; or (3) establish applications, services, and innovative business and marketing models with technological content, and increase industry's added value.

3.Taiwan Industry Innovation Platform Program

The MOEA Industrial Development Bureau and the Ministry of Science and Technology are jointly implementing the "Taiwan Industry Innovation Platform Program" to guide industries to develop towards greater value, and to encourage companies to enter high-end product application markets to increase industry's overall added value. For companies owning R&D teams in Taiwan, the program provides 40-50% of the funding required for theme-based R&D projects, and up to 40% of funding for R&D projects proposed by the companies themselves.



Successful Examples of Foreign Companies

1

Investment in production and manufacturing

Honda Taiwan, a fully-owned subsidiary of Honda Japan, plans to invest an additional NT\$4 billion over five years starting from 2019. The production equipment at its Pingtung car assembly plant will be upgraded and new models introduced to strengthen its presence in the Taiwan market. At the same time, Toyota not only acquired a stake in Fukuta but is also planning to engage in technical cooperation on automotive motors for EVs, and plug-in hybrids (PHV). Kuozui Motors, Toyota's production plant in Taiwan, recently invested NT\$6 billion in production line upgrades and the introduction of hybrid models.

2

Cooperation on R&D and testing facilities

NVIDIA, the American graphic card maker, has signed a memorandum of understanding with Taiwan's Ministry of Science and Technology as well as its subordinate National Research Laboratories to take part in the development of Taiwan's self-driving vehicle industry and to cooperate with Taiwan CAR Lab on technical applications. Magna from Canada has already established a R&D center in Taiwan to develop automotive ultrasonic sensors and associated parking/reverse assistance systems, automotive video and front recognition camera modules/systems. Additional investments are planned for R&D projects in new fields.



3 | Cooperation on talent development |

The German Volkswagen Group has established an education and training center in Taipei City's Xizhi District. The center will be the company's largest training organization in the Asia-Pacific region outside of China. To establish a presence in Taiwan's EV market, the "e-Mobility Center" designed specifically for EVs was expanded to become the training base for EV technicians in Taiwan. VW is cooperating with Delta Electronics on EV charging infrastructure as well. Honda Taiwan is engaging in industry-academia cooperation with technical and vocational colleges in Pingtung for training technical talent and to provide them with job opportunities.

4 | Marketing collaboration |

Gogoro formed a partnership with Sumitomo Corporation in 2017 and launched the "GoShare" smart scooter sharing and lease service on Ishigaki, Japan. Gogoro worked with Korean scooter component supplier TIC in 2019 and set up battery exchange stations in Gangnam-gu in Seoul to promote commercial vehicles in the logistics, delivery, and corporate vehicle use market. As of June 2020, 14 battery exchange stations have been set up in Seoul and stations will continue to be added in the second half of the year. Sumitomo Corporation invested in RAC Electric Vehicles in November 2019 and acquired 7% of the shares of RAC Electric Vehicles through private placement at a price of NT\$126 million. The parties focused on cooperation in electric bus production and services and RAC Electric Vehicles leveraged the global marketing service outlet to expand into the global market.



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