

CHAPTER 4

ELECTRIC CARS AND TESLA

Under the situation that the global automobile industry is confronted with the financial crisis and the new energy problem, the development of electric vehicle, the electrification of the automobile energy power system and the strategic transformation of the traditional automobile industry have already formed a broad consensus in the world. In order to solve the energy environment restriction and realize sustainable development, the global automobile industry has been actively exploring and promoting the transformation of the transportation energy power system for a long time, especially since 21st century, facing the financial crisis, the high volatility of international oil price and the increasingly severe pressure of energy saving and emission reduction, the world automobile industry has entered , the development of electric vehicles has become a highly common international technology route to realize the transformation of transportation energy, and the world electric vehicle industry has entered a new stage of rapid development. (Han, 2017)

4.1 Current status of international electric vehicles

America (U.S.A.)

Electric cars can sometimes be seen on the streets of big cities and away from the city's high-speed roads. The shuttle of these figures is inseparable from the U.S. government's promotion of electric vehicles. The first is to build a network of charging stations. Take Tesla, for example, there are 21 recharging stations along the 101 Highway from San Francisco to Santiago, averaging 38.4 kilometres of 1 charging stations. In addition, there are more than 30,000 places with rechargeable sockets, some are shopping malls, large chain stores, such as to attract customers, they are often in the car park, and located next to the handicapped parking priority, there is a special logo, unmanned supervision of their own services. Highways, every reasonable distance to build a charging station, each charging station has a regular 240-volt charger, charging time to spend 4 hours, with a 480-volt DC fast charging equipment, depending on the need for each charge of about 15-30 minutes. The 5th speed is now in the two states, with a charging station every 25 to 50 miles. Other major highways are also building a dense enough charging station. California's public recharging stations are the first in the United States, accounting for more than one-fifth of the total. California is also implementing a plan called the western Coast Electric Highway to dock with the Washington state and Oregon State's 5th Highway charging station. After the plan is completed, electric cars from the north of Canada can be driven to the Mexican border in the south. Many American States give preferential policies to building charging stations. In Oregon State investment construction charging station, 35% of the cost can enjoy duty-free treatment. Maryland not only gives 20% of the tax benefits, but also provides a 50% refund subsidy to families for their own petrol-electric hybrids, including charging sockets for their own hybrid hybrids, private investment-building charging stations and additional charging facilities at petrol stations, up to 900, 5000 and 7500 dollars respectively. Tesla has also launched a new model of the pilot, the replacement of the entire battery pack, the time as long as 90 seconds, plus uninstall the battery isolation cover, also do not three minutes, then the Audi A8 full oil time is also short, the cost is similar

to the luxury car refueling, but owners need to return to install their original More and more new charging stations, will certainly further promote the popularization of electric vehicles.

Netherlands

The Netherlands has a population of more than 16 million, but 18 million bicycles, a veritable bicycle kingdom. Since 2011, the Dutch government has been promoting electric vehicles by reducing taxes on electric cars and building public-charging piles. As of January 1, 2016, the number of electric vehicles in the Netherlands accounted for 211,000 vehicles, accounting for One-fortieth of total car ownership. In electric cars, the pure electric cars accounted for about One-twentieth, the rest are hybrids, and in the near future, the ubiquitous electric cars and electric bicycles will become another major feature of the Netherlands landscape. The Netherlands is a big producer of natural gas, with its natural gas development among the world's top five. Now 61% of the Dutch electricity comes from natural gas, 23% coal, and 12% from sustainable energy and nuclear power. The goal of the Netherlands is that by 2040 all cars will be powered by sustainable energy, such as wind, solar, biomass, etc. This is a majestic goal. And over the past few years, the Netherlands has been rapidly moving towards this goal. Of this share of electric vehicles, only about 13% of pure electric vehicles. More than 80% of electric vehicles are PHEV Plug in Hybrid Electric Vehicle and EREV Extended-range Electric. The number one in pure EV sales is Tesla's model S. In the popularization of electric vehicles, the most important thing is that the Dutch government spared no effort to build public charging piles, especially the rapid charging pile, making BEV charging more and more convenient, which will reduce people's anxiety about BEV. In addition, the increasingly stringent tax exemption policy makes it increasingly difficult for PHEV to meet the tax exemption standard. Future BEV sales will overtake PHEV. The Netherlands will become a model market for electric cars in the near future.

Norway

The Norwegian electric car market originated in 2010. At present, Nissan Leaf with a 40% market share in the Norwegian electric vehicle market is a ride of the dust. In the streets of Oslo, the electric cars are everywhere, they are already an ordinary means of transport. In fact, the popularity of Norwegian electric vehicles is attributed to the government's many incentives, these policies run through the purchase of electric vehicles, use and ancillary facilities and other aspects of the construction. For example, the purchase of electric vehicles in Norway is exempt from registration and VAT and does not impose a crossing tax. Drivers who commute to work in Norway can even use the bus lanes. In the peak of walking on the road will inevitably encounter traffic jams when the state of impatience, compared to the use of bus lanes but a lot quicker. Not only that, electric car drivers can also use parking spaces for free in public places. Tesla S, for example, sells 75,000 euros (about 101,000 dollars), and professional website www.bilnorge.no calculates that the tax exemption for this car is € 91,000 (122,500 USD). Norway is also the first stop in Tesla's European market, to be sure. For such a generous "privileged" treatment, the European Automobile Industry Association has said: Norway is the most widely promoted electric vehicles, the most preferential policies of European countries. In addition, the exemplary effect of celebrities also played a role. In September 2013, the Norwegian crown Prince Haakon bought a Tesla's pure electric car, which led thousands of of

people to buy electric cars. In September, the new car registration, electric cars won the championship. Of course, all this is thanks to Norway's deep environmental culture. Although it is one of the world's top oil exporters, its oil supply is extremely "stingy" and expensive. In fact, much of Norway's energy comes from hydroelectric power. The Norwegian Electric Vehicle Association says the most important thing for more people to buy electric cars is to have longer mileage and quicker and more convenient charging, which is the real weakness of electric vehicles. At present, the "privileged" status of electric vehicles is bringing more and more trouble to Norway. If the Norwegian government allows electric cars to use the bus lanes, leading to peak rush hour bus road congestion, hinder the operation of buses, affecting bus passengers travel. So, the Norwegian people want the government to ban electric cars from using these lanes.

France

France, with a population of more than 66 million, is the largest country in western Europe. Its electricity source accounts for nearly 80% of nuclear power. The tourism industry is a major economic pillar of France, the development of electric vehicles, the use of nuclear power to drive cars, can reduce energy dependence, but also to protect the environment, protect and enhance the attractiveness of the tourism industry. In absolute terms, France is the country with the highest sales of electric cars in Europe. Norway is the winner in terms of share. France's Automobile Manufacturers Committee (CCFA) released data showing that in 2015 the total number of French car sales of 1.91 million vehicles, of which the sales of 17,266 vehicles, accounting for about 1%. Compared with 2014, the sales of electric vehicles increased by 64%. Why is France's electric car so well developed? The biggest reason is the government's strong support for electric-vehicle buying subsidies. Like China, the French Government provides direct financial aid, but the subsidy is tied to the carbon footprint per kilometer, not the mileage that relies on pure electricity. and carbon emissions require only pure electric cars to meet. For pure electric vehicles, the government subsidy cannot exceed 27% of the tax price of the car. The ratio fell to 20% for other cars that were 20 grams higher than carbon emissions. From the amount of subsidy, France's 6300-euro ratio in China's more than 100,000 subsidy (against) much less. But if you consider buying + use costs, France's subsidy measures appear to be more forceful, and if the home installed a charge pile, also save the trouble of refueling. The second reason is the increasingly developed charging network. The French population is more than 66 million, the car stock is 38 million, and the public charge pile is over 10,000. The coverage of charge piles is among the highest in the world. On the one hand is the French government's strong support for the construction of rechargeable piles, such as tax breaks to encourage companies to invest in rechargeable piles. On the other hand, Autolib, an electric-car leasing company, is also speeding up construction of its own charging pile, speeding up the charge pile construction in France. The French government's ambition is that by 2030, the number of charge piles in France will reach 7 million! And many companies have begun to study electric cars and rechargeable pile after the popularization of the power grid load problems, the commercial model of waste batteries. The French government's subsidies for electric cars are also waning, but from the current momentum, electric cars can slowly move into less-subsidised ways. In addition, the French government has already planned to enact laws to unify the country's electric-car charging network, ensuring that electric vehicle owners can charge at

all electric-car charging stations in the country without being limited to specific charging operators. (John, 2017)

Germany

"Beer, football, the majestic Cologne Cathedral, the fairytale Swan Fort, and of course the German car." "German electric car sales are growing, but not as large as the United States, Norway, Holland, and so on, mainly because the German government does not offer high purchase subsidies for electric vehicles." In Germany, electric cars only enjoy exemption from car registration tax and annual travel tax, unlike Norway, which does not exempt the purchase tax, nor does it offer direct cash subsidies like the U.S. Registration tax and travel tax amount is very small, for ordinary vehicles generally dozens of euro. To the Germans, the cost of buying an electric car is much higher than the equivalent of a petrol-powered vehicle, enjoying only dozens of euro tax breaks. Although electric cars are cheaper to use than petrol cars, the cost of car purchases is too high, the main reason for the low sales of electric cars in Germany. In response to the development lag in electric cars, the German Ministry of Finance proposed a 1.2 billion euro (1.3 billion US dollar) subsidy for the government and the auto industry. According to the proposal, consumers who buy electric cars will receive € 5000 in subsidies from the government and the auto industry from 2016 to the summer of 2018, and consumers of hybrid cars will receive € 3000 in subsidies. When consumers buy electric cars, they will receive subsidies on a first-come-first-served basis, and no additional subsidy will be provided after the 1.2 billion-euro subsidy is fully disbursed. The German Treasury also proposed a 300-million-euro subsidy to encourage the construction of electric vehicle charging piles. Ms. Merkel's goal is to reach 100 million vehicles in Germany by 2020. According to foreign media, Germany will ban the sale of traditional internal combustion engine cars by 2030, and the new vehicles to be registered from that year must be zero-emission models in order to achieve the goal of reducing the 80-95% of carbon dioxide emissions in the country by 2050. With the deep accumulation of the technology and brand of the German cars, combined with the vigorous implementation of the policy, Germany electric cars have a full stamina.

Japan

Japanese carmakers rely on their technology and cost-performance to gongchenglvede the world's leading electric car market. And in the stronghold of Japan, the vast majority of sales are from local manufacturers, the local electric car market good development to ensure its survival space, this is Shou. In 2009, Japan's electric car sales were virtually nil., but by the end of 13, electric cars had sold nearly 30,000 vehicles. Bev's annual sales have exceeded 16,000. Japan's Ministry of Economic Industry (METI) issued the "EV`PHV Road Map", proposed to 2020, so that Japan's domestic pure electric vehicles and plug-in hybrid car holdings reached 1 million vehicles. In the World electric car technology pattern, Japan is a solo show. Both in absolute terms and in share, Japan's electric car market is one of the world's biggest markets. Why is Japan's electric car market developing well? First and foremost, the cost of electric vehicles (buy + use) has arrived at a reasonable level relative to the average car. In addition to direct and high financial subsidies, there are various tax incentives. Buying a car in Japan requires a one-time payment of an acquisition tax and an annual tax on emissions and a vehicle tax related to engine emissions. But for electric cars, the purchase tax and the emission

tax are all exempt, and the vehicle tax can be waived by half. Second, in addition to direct subsidies for automobiles, the Japanese government has developed subsidies for the installation of charging piles for companies and individuals and has vigorously developed charging infrastructure. Finally, the number of gas stations in Japan is dwindling, which may also be a factor in considering buying electric cars. And most people will install a common charge pile at home, using the night time to recharge the car, it saves the trouble of finding a gas station. Some readers think Japan's electricity prices are cheap, so sales of electric cars are good. In fact, in 2011, 65% of Japan's electricity came from fossil fuels, 17% from nuclear power and hydroelectric power 17%, and solar energy accounted for only 1%. After the 2011 Fudao nuclear Power plant accident, the nuclear power plant in the Japanese people's protest quickly shut down. Electricity prices in Japan have been rising over the past few years as the gap in nuclear power has been filled by fossil fuels. So Japan's electric car development compared to other developed countries in Europe and the United States, there is a shortage of power sources, which limits the development of electric vehicles. The Japanese sense of crisis has been strong. As early as the 1970s, the Japanese government has included the development of electric vehicles in the industrial planning of the automotive industry and plans for the development of electric vehicles such as the construction and renovation of charging stations, the development of new technologies, such as batteries. At present, there are a variety of models in the global market and has been to maintain the head of electric car sales is still the Japanese electric vehicles.

4.2 Current status of electric vehicles in China

China's central and local governments, which have strong financial support, are the most prominent in comparison with the automotive power. China will be one of the seven strategic industries with new energy vehicles. "The development of new energy vehicles is the only way for China to move from a big automobile to a powerful country, to increase research and development, to study the market carefully, to develop products that adapt to various needs, and to make it a strong growth point". The top national leaders called for the development of new energy vehicles and the development of new energy vehicles in China's seven strategic industries. The development policy of China's new energy vehicles is comparatively sound and more systematic. The central finance and local finance simultaneously subsidize the new energy vehicle production cost difference, in the purchase tax deduction, in the new energy bus operation to subsidize, but also has set up the new Energy Vehicle special license plate, in the road passes the right to give priority to. Such a number of support policies are not in other countries. Encouraged by many positive policies, China's new energy vehicle market demand spiral, a year a big step. 2016 500,000, 2017 800,000, 2018 will exceed 1 million vehicles, 2020-year plan for 2 million vehicles. In the rapid development of China's new energy vehicles, the Chinese government is also beginning to study new incentives to promote the development of new energy vehicles in China to the Smart network, the Chinese government issued to the Intelligent Network of Automotive development Planning, is the concrete embodiment. With the above characteristics of China's development of new energy vehicles model, has become the world's auto power research samples. China's technology for developing new energy vehicles is different from that of other powerful cars. The main technical route of the United

States car companies is to develop pure electric and plug-in hybrid vehicles; Japan and South Korea are the main technical route to develop hybrid power, pure electric and fuel cell vehicles; The main technical route is to develop pure electric and plug-in hybrid vehicles, the Chinese car enterprises to pure electric and plug-in hybrids mainly, Take into account the fuel cell vehicle route. What needs to be explained is that China's new energy vehicle route is finally clear, but also through the continuous exploration and discussion process. China is not a powerful automobile, it must learn from the automobile power. But how to learn? Initially advocated more, to learn from Japan, to mix technology as a breakthrough, to the United States, to increase the program hybrid car as a foothold; to Germany, to plug-in hybrid electric car as the focus. Chinese people use their own philosophy to guide their own practice, all learn, do not learn, and finally form their own characteristics of the technical route: to the main breakthrough in the car, the public transport vehicles, to achieve the world's first Shenzhen public transport all achieve pure electric performance, made the world's first Wuhan (BRT) 18 meters Bus All the results of the electric, in the A00-class passenger car on the basis of scale industrialization, to obtain the world's first Taiyuan taxi all achieve pure motorized results. The advantages of the technology of pure electric vehicle and the technology of fuel vehicle are accepted by the plug-in hybrid electric vehicle. The development of plug-in hybrid vehicles in China has also achieved mass production and achieved equally good results in technology. Taking into account the development of fuel cell vehicles, fuel cell vehicles must be developed in China. Why is it different from other powerful countries in China to develop new energy vehicles? China's development of the automotive industry has been several decades, with a lot of lessons, pay a lot of tuition, but also accumulated a lot of successful experience; The high technology threshold for fuel vehicles has already been elevated, and many technologies have been firmly controlled by advanced countries, and China has been tracking, but cannot go beyond. Pure electric vehicle technology threshold for everyone is similar, fuel car developed countries compared with China, there is no first advantage. But China's power battery industry has a certain comparative advantage, such as China's power battery industrial chain is relatively complete, and now Europe does not have a production of power battery factory. On the technical route of the pure-power vehicle, the fuel technology is dominant in general, and the electric technology is auxiliary. The Chinese government has completely abandoned the hybrid technology route, implementing a plug-in (or program) technology route that is aligned with the purely electric-driven technology route. Electric fuel vehicle is the basic trend. It shows that the technology of fuel vehicle can not meet the requirements of modern (future) social development. Although the fuel vehicle is still a major vehicle for a long time, especially a freight truck, its orderly substitution is an objective trend. China's development of new energy vehicles is a national strategic choice and positioning, not expedient, natural requirements stand high, see far. In a word, the technical route of developing new energy vehicles in China must be different from other countries and must be embodied in the technical route of development.

4.3 Tesla electric vehicle generalizations

Tesla Inc. is a U.S. sales and marketing of electric vehicles, by Martin Eberhard (Martin Eberhard) engineers, founded on July 1, 2003, headquartered in the United States, California, Silicon Valley zone. Tesla Motor Company named electrical engineer and physicist Nikola,

specializing in the production of pure electric vehicles, the production of several major models containing Tesla Roadster, Tesla model S, Tesla model X. Tesla Motor Co. is the world's first electric car company to adopt lithium-ion batteries, and its debut electric car is roadster. From 2008 to 2012, the company sold more than 2,250 roadsters in 31 countries. In 2010, the company started to roadster on the right side of the UK and Ireland market and expanded its sales to Australia, Japan, Hong Kong, Singapore and mainland China. November 22, 2016, Tesla announced that the company has completed a takeover of solar company SolarCity. February 1, 2017, Tesla Motors Inc. officially announced that the company's registered name of the "car" meaning of the word "Motors" removed, converted to Tesla Inc. October 22, 2017, Tesla and the Shanghai municipal government reached an agreement to build a factory in China. November 17, Tesla officially released Roadster in the United States. Speaking of Tesla, he had to mention that CEO Elon Musk, born in South Africa June 28, 1971, immigrated to Canada at the age of 18. Engineers, philanthropists, PayPal (the largest online payment company), SpaceX space exploration technology, Green sports car company Tesla and the CEO of the SolarCity four companies. SpaceX, CEO and chief technology Officer of Space exploration Technology, eco-sports car company Tesla product designer. November 21, 2013, the famous U.S. financial magazine "Fortune" unveiled "2013 business figures", Tesla Motor CEO Musk top. December 14, 2016, won the "2016 years of the most influential CEO" honor. February 7, 2018 4:45, the SpaceX company's "Heavy Falcon" launch vehicle at the United States Kennedy Space Center for the first successful launch, and successfully completed two first-level booster rockets complete recovery. Initially Tesla as a small electric vehicle manufacturer, the first of its products have a great limitation, after all, at this stage of the pure electric car market itself is very immature, and the manufacturing cost of electric vehicles compared to the general energy of the conventional vehicles have no advantage. What's more, Tesla's relatively independent manufacturers, a year's output is about 20,000, can survive is a big test. So, for Tesla, brand positioning will be crucial. and CEO Ellon Masc obviously has a very clear understanding of this, perhaps by a lot of public figures, especially Hollywood stars keen on the Toyota hybrid Prius, inspired by his positioning Tesla electric vehicles as high-end consumer goods, such as public figures such as high-income group is his main target customer base. The reason is simple, in the public's growing awareness of environmental protection today, for public figures, the opening of an environmentally-friendly electric car in the lens is certainly better than the opening of a V12 supercar more decent, more to win goodwill. So, when it comes to a performance-style, unique electric car like Tesla Model S, even though the price is high, there must be a lot of people willing to pay for it, so Tesla has a customer base like a luxury. (Zhang, 2017)