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Comparative Analysis of Existing Policies in the Electric Vehicle Industry in China and the United States

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Abstract: As the electric vehicle industry grows and global climate issues become more serious, this paper compares U.S. and Chinese policies in the electric vehicle industry in four areas: electric vehicle industry supply chain, electric light-duty vehicle segment, electric heavy-duty vehicle segment, and electric vehicle supply equipment, to analyze the existing policies in the two countries. This paper analyzes whether the existing policies in the two countries are up-to-date, practical, and effective. In addition, this paper analyzes the similarities and differences between existing policies in China and the U.S. based on factors such as the international environment, political framework, technological development, and energy reserves. In general, there is a trend in both countries to shift the focus of policy support from the electric light-duty vehicle segment to the electric vehicle industry supply chain and electric vehicle supply equipment. Compared to the U.S., China has made greater efforts to promote pure electric vehicles than plug-in hybrids.

Keywords: Policy comparison, electric vehicle industry, China and the U.S., carbon neutrality

1. Introduction

As the problem of global warming is becoming serious, more and more countries are paying attention to this issue. To mitigate the negative impacts of greenhouse gases on current human activities and future development, reducing carbon emissions has become a practical solution. So the concept of "carbon neutrality" was introduced, and people actively took various actions to offset carbon dioxide emissions and tried to achieve relative "zero emissions" goals. Apart from planting trees, reducing carbon dioxide emissions is a very effective solution in the short run. As a result, the vehicle industry, with its high CO2 emissions, needs to be transformed. Many countries are looking to replace fuel vehicles with electric vehicles that use cleaner energy [1]. As political and economic leaders, China and the United States have introduced policies to promote the development of domestic and global electric vehicle industries.

China's EV industry has been able to proliferate over the past two decades. The Chinese government's policy support framework has undergone several transformations according to the different stages of the industry's development. From 2009 to 2015, before forming a complete industrial chain, China established a subsidy system from small-scale pilots to large-scale rollouts. Through the Guiding Opinions on Accelerating the Promotion and Application of new energy vehicles (NEVs) issued by the General Office of the State Council in 2014, the Chinese government has introduced many policies such as the exemption of purchase tax for new energy vehicles to

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promote the expansion of the NEV market [2]. On the next stage, which is from 2016 to 2020, China promoted the development of the EV industry through "double points" management and tax incentives [2]. The "double points" policy refers to Corporate Average Fuel Consumption points and New Energy Vehicle points. This policy pushes automakers to produce cost-effective energy electric vehicles as much as possible while lowering fuel consumption of fuel vehicles as much as possible at the same time, to improve their new energy points and CAFC fuel consumption points. [3]. This policy was also revised in August 2023 and continues to be implemented. The new policy not only lowers the points for standard models of new energy vehicles but also adjusts the points calculation method and the points ceiling to encourage more pure electric vehicles to drive more miles. In addition, based on retaining the original points trading between firms, the "new energy vehicle points pool management" section has further stabilized the supply and demand of the points market and the price of points [4]. The implementation of the new policy for firms to obtain new energy points further tightened, which puts forward higher requirements for the innovative development of new energy vehicles, which is conducive to the development of new energy vehicles of higher quality. After 2021, other key components of the EV industry and market began to develop and mature. The Chinese government recognized that the development of electric vehicles is an important step in combating climate change and promoting green development against the backdrop of its strategy of insisting on purely electric drives. The government discovered the current problems about the lack of core technology innovation capability, lagging infrastructure and quality assurance system, and increasing market competition in China's EV industry. Hence, the Chinese government has introduced targeted policies to encourage market development from multiple angles [5].

U.S. policy toward the electric vehicle industry is more focused on supply chain development outside of the light-duty vehicle (LDV) segment and heavy-duty vehicle (HDV) segment. President Biden signed the Bipartisan Infrastructure Law in November 2021, and the government has invested billions of dollars in building a modern electric grid. This has built electric vehicle charging networks, invested in new clean energy sources, and created job opportunities [6]. After that, President Biden signed the Inflation Reduction Act (IRA), an important document, on August 16, 2022. Through a $370 billion investment, the Biden administration has accelerated America's shift to electric transportation [7]. This will reduce America's dependence on oil, reduce greenhouse gas emissions, and increase job opportunities.

2. Policies in China

2.1. The Industry Supply Chain

First, for the EV industry supply chain, over the past decade, China has continued to use incentives from both supply and demand sides for joint ventures with international vehicle makers and domestic firms to increase production, especially policy support at the local level. This has led to rising penetration of new energy vehicles in China, as evidenced by production targets set by local governments. [1]. For example, Chongqing aimed to produce and sell more than 10% of the Chinese EV industry with new energy vehicles [8]. On the other hand, the Chinese government provided subsidies and purchase tax exemption to incentivize both consumption and production of electric vehicles, and the 2022 New Energy Vehicle Promotion Subsidy Program is one of these subsidies [9].

2.2. The Light-Duty Vehicle Segment

Second, for the LDV segment, which is the largest in the market, more targeted local policies are gradually taking the stage as the effectiveness of subsidy policies at the national level is reflected. China's sales share of the new energy vehicle market exceeded its original target of 20% by 2025 and is already approaching 30% in 2022 [5]. Furthermore, China's policy goal is to reach a 50% share of

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new energy vehicle sales by 2030 as a way to reduce air pollution and lower carbon emissions [10]. While the national subsidy program for new energy vehicles has ended, the extended purchase tax exemption for new energy vehicles remains a fiscal incentive at the national level [9]. For local policies, 18 provinces in China have clear policies that are expected to achieve carbon neutrality by promoting the development of the electric vehicle industry [11]. For example, Beijing has announced incentives to replace internal combustion engine vehicles with NEVs, and a policy of subsidizing the replacement of new energy vehicles. The policy stipulated that from March to August 2023, individual consumers who scraped or transferred out an LDV registered in their name for more than one year and purchased an electric LDV from an automobile sales company would receive a subsidy of 8,000 RMB or 10,000 RMB [12].

2.3. The Heavy-Duty Vehicle Segment

Third, China has not neglected policy incentives for other segments of the electric vehicle industry. For the HDV segment, local governments in China have introduced policy goals related to reducing carbon emissions. For example, Tianjin's policy goal is to have 80% of new energy vehicles in public transportation, leasing, logistics, and distribution vehicle sales dominating the market by 2025 [13]. However, compared to the LDV segment, the incentives for the HDV segment are slightly more homogenous, which is also related to the current state of vehicle market development in China. In contrast, the characteristics of the LDV market allow it to attract more manufacturers to produce more electric cars and gain more profits.

2.4. The Electric Vehicle Supply Equipment

Fourthly, the Chinese government is placing more emphasis on electric vehicle supply equipment, or charging devices, and has recently introduced more policies to promote their construction. The Chinese government is promoting the comprehensive coverage of charging networks from two different perspectives: urban construction and rural construction, based on different layout characteristics. The government is also encouraging more local governments to reduce or waive charging infrastructure rentals by phases through the "Peak and Valley Time Sharing" policy, which encourages users to choose different times of the day for charging and improves the efficiency of charging device utilization [14].

3. Policies in the United States

3.1. The Industry Supply Chain

The Inflation Reduction Act accelerates the adoption of electric vehicles in the U.S. through tax incentives and funding policies and focuses on strengthening the supply chain that enhances the EV industry. First, users of new plug-in electric vehicles or fuel cell vehicles (FCVs) who meet eligibility requirements are eligible for the Clean Vehicle Tax Credit [15]. This makes more U.S. citizens willing to purchase EVs, which leads to better promotion from a demand level. From a supply perspective, the Inflation Reduction Act also provides manufacturers with production tax credits [7]. Specifically, the U.S. government provides subsidies for both battery production and assembly, and these subsidies may even account for up to one-third of the total battery price [1]. Not only that, but in January 2023, the U.S. also signed a Memorandum of Understanding with Zambia and the Democratic Republic of Congo [7]. This MOU supports DRC and Zambia in establishing a productive supply chain from the mine to the assembly line, and the U.S. would work with resource-rich countries to develop electric vehicle battery supply chains.

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3.2. The Light-Duty Vehicle Segment

For the LDV segment, U.S. policy relied more on each state's incentives and regulations than on national harmonization. For example, the California Air Resources Board in 2022 established a minimum zero-emission vehicle sales share for LDVs of 35% in 2026 and 100% by 2035. This means that vehicles sold after 2035 must be zero-emission vehicles or plug-in hybrids [16]. The rule, called Advanced Clean Cars II, has not only been approved in California, but has been adopted or is about to be adopted in seven states, including Washington, Oregon, and New York. This brings the rule to cover 25% of U.S. sales of passenger LDV [1].

3.3. The Heavy-Duty Vehicle Segment

Third, in the HDV segment, the IRA provided billions of dollars for the construction and subsidization of vehicles and infrastructure [7]. In addition to this, the U.S. provided substantial financial support for the purchase or lease of electric transit vehicles. Federal Transit Administration announced $1.69 billion in financial support for low- and zero-emission buses and ancillary facilities in June 2023, a policy that involves 130 programs [17]. 46 states and areas have more adequate funding for the purchase of zero- and low-emission public vehicles and the construction of ancillary facilities. In this way, HDVs in public transportation can transition from carbon-emitting vehicles to cleaner vehicles.

3.4. The Electric Vehicle Supply Equipment

Fourth, for charging units, the U.S. approved the National Electric Vehicle Infrastructure Formula Program which would use more than $1.5 billion to build charging units on highways [18]. Charging devices would be built in large numbers on major routes to guarantee that the power of electric vehicles can be adequately secured. On top of that, the IRA also offered a tax credit for almost one thousand dollars for home charging facilities. In addition to the national level, local state governments have also introduced incentives. California, for example, offered financial support for HDV charging infrastructure [19]. More charging stations for medium- and heavy-duty trucks have more money to build through this funding plan offered by California.

4. Comparison

Looking at China and the United States in comparison, it is easy to see that there are some similarities in policy between the two countries. First, both countries are aiming to build a cleaner energy electric vehicle industry as a way to reduce carbon emissions and reach the goal of carbon neutrality. China has already exceeded its original goal of reaching a 20% sales share of the NEV market by 2025. The U.S. is to have a 50 percent share of electric vehicle sales in the U.S. by 2030. In this way, not only will the serious problem of global warming caused by greenhouse gas emissions be mitigated, but the two countries will also be recognized for their innovative capabilities and international influence. Secondly, with the development of the electric vehicle industry, especially the maturing of the LDV segment, China and the U.S., as leaders in the industry, have noticed that the supply chain and the development of charging devices need to be taken more seriously, and have also introduced relevant policies. The development of the entire industrial chain of the electric vehicle industry has also benefited from this. Third, both China and the United States use tax relief policies and financial allocation subsidy policies as the main incentives. The governments of both countries have considered both supply and demand levels to support both suppliers and consumers in the electric vehicle industry.

However, there are some differences between the policies of China and the United States. For example, most of China's policies are formulated by the central government, which sets goals and

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directions and then gradually disseminates them to individual provincial and municipal governments for further deployment. In contrast, although the U.S. also has a government agency with a much broader scope of authority, such as the White House, individual states have much more autonomy and broader freedom to implement specific policies and rules. The different political structures lead to the difference between the two countries. Besides, China's policy is more supportive of pure electric vehicles than plug-in hybrids. In the United States, the level of support for both types of EVs remains largely the same. This is due to the difference in the development of engine manufacturing and gasoline feedstocks for conventional fuel vehicles in the U.S. and China. China's engine manufacturing technology is less mature and independent than that of the United States, and gasoline resources are not as abundant. This gives China a policy and economic advantage in promoting pure electric vehicles that rely on cleaner energy, which is currently more efficient than the U.S. in terms of penetration.

5. Conclusion

In conclusion, different policies in China and the U.S. are driving the progression of the EV industry. As times change, both China and the U.S. are focusing more on the development of the entire chain of the electric vehicle industry, and policies are covering more diverse market segments and areas. In addition to the electric light-duty vehicle segment, which has the highest market maturity and vehicle availability, the policies also cover the supply chain, the heavy-duty vehicle segment, and electric vehicle charging station and system.

On the other hand, China's current policies have clear objectives at the national level, and local policies are mostly formulated in line with the overall policy goals. In addition, the high penetration of electric vehicles in China has allowed the country to further promote purely electric vehicles, which was powered by cleaner energy with lower carbon emissions. In the United States, on the comparison, despite the availability of financial subsidies and support at the national level, different states have more autonomy and freedom in policy formulation. Coupled with the difference in energy resources, the U.S. policy support for pure electric vehicles and plug-in hybrids is basically the same.

From the international perspective, the policy development of both China and the United States provides examples for other countries and plays a leading role. Overall, promoting the development of the electric vehicle industry is beneficial for human sustainability in the long term.

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