Research on the Implementation Effect of Policies Related to New Energy Vehicles

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Abstract. Global climate change has become an important issue in the 21st century. Human activity is the primary source of greenhouse gases, particularly when fossil fuels are burned. China suggested the "dual carbon" objective in 2020. In light of this, the new energy vehicle sector has grown quickly, becoming as a major engine for China's economy and a market leader worldwide. Statistics indicate that in 2023, China will continue to break new records for new energy vehicle production and sales. However, it still faces technical bottlenecks, insufficient charging infrastructure, and uneven policy implementation. In order to do this, this article examines how new energy vehicle-related policies are implemented: Policies pertaining to new energy vehicles have a considerable implementation impact that boosts sales, but they also present difficulties such inconsistent policy implementation, technological obstacles, and inadequate infrastructure development. On the basis of this, certain recommendations are made: encourage the development of battery technologies and charging stations, particularly in remote regions, and enhance the enforcement and oversight of policies to guarantee efficient resource allocation. In addition, encouraging enterprises and consumers to enhance environmental awareness will help achieve dual economic and environmental benefits. These actions will support the industry's sustainable growth in new energy vehicles and aid in the fight against climate change.

Keywords: New energy, policies, market sales, technology.

1. Introduction

The worldwide community has been deeply concerned about global climate change in the twenty-first century. Long-term modifications to temperature and weather patterns are referred to as climate change. Natural events like significant volcanic eruptions and variations in solar activity may be the source of these shifts. However, since the 19th century, human activity—particularly the combustion of fossil fuels like coal, oil, and natural gas—has been the primary driver of climate change. Fossil fuel combustion releases greenhouse gases into the atmosphere, which retain solar heat and cause global warming. Methane and carbon dioxide are the two primary greenhouse gases that contribute to climate change. These gases are produced when coal is used for home heating or petrol is utilised in automobiles. Carbon dioxide is also released during the reclamation of land and forests. The primary sources of methane emissions are oil and gas extraction and agriculture. Major sources of emissions include energy, industry, transportation, building, agriculture, and land use.

According to climate experts, greenhouse gas emissions from human activity are warming the planet more quickly than they have in the previous 2,000 years. In response to the problem of global warming, China proposed on September 22, 2020 two goals known as "dual carbon".

One of the most rapidly expanding and promising new industrial sectors is the energy sector, which is being driven by the global low-carbon transformation and carbon peak neutralisation goals. China aggressively encourages the use of new energy vehicles and has gone through a start-up, large-scale, and robust development process in the new energy sector. It has shown to be very competitive on a global scale in addition to becoming a focal point of the home economy and a major engine of economic progress. China's new energy vehicle production and sales have led the globe for nine years running since 2015, according to data from the country's National Bureau of Statistics. In 2023, automobile exports will overtake Japan to take the top spot globally. New energy vehicles, as a symbol of my nation's rapidly emerging new energy sector, demonstrate both the robust resiliency of my nation's economy and the positive trajectory of its industrial upgrading.

The market for new energy vehicles in China has grown significantly in recent years, and sales have kept rising to all-time highs. Although they have come a long way, new energy vehicles still have a long way to go. For instance, China's new energy vehicle industry is still lacking in sufficient and unbalanced market-oriented development. This is primarily evident in the underexploration of the rural market due to factors like power batteries' low temperature adaptability and a lack of adequate charging and swapping facilities. In addition, there are battery recycling and environmental protection issues, imperfect charging infrastructure construction, and range anxiety, which are all important issues that need to be addressed. In addition, global economic uncertainty and supply chain risks also have potential impacts on the new energy vehicle industry. Policies play a vital role in solving these important problems.

This article aims to analyze the implementation effect of China's new energy vehicle-related policies and put forward targeted suggestions for the new energy vehicle industry.

2. Analysis of the Status of New Energy Vehicle Implementation

2.1. Policy Implementation

The State Council of China convened an executive meeting on June 2, 2023, with the aim of examining policy measures aimed at fostering the superior growth of the new energy vehicle sector. China has developed policies primarily in three areas. The acquisition of new energy vehicles is the first factor. To maintain and improve the new energy vehicle purchase tax exemption policy, the ministries of industry and information technology, state administration of taxes, and finance released statements.

Constructing a top-notch infrastructure system for charging is the second factor. Specific plans for building charging infrastructure were outlined in the "Guiding Opinions on Further Building a High-Quality Charging Infrastructure System" published by the General Office of the State Council.

The third aspect is to support the going to the countryside of new energy vehicles and rural revitalization. The "Implementation Opinions on Accelerating the Construction of Charging Infrastructure to Better Support the Going to the Countryside of New Energy Vehicles and Rural Revitalisation" were developed by the National Development and Reform Commission and the National Energy Administration. Building reasonably advanced charging infrastructure, encouraging the purchase and usage of new energy vehicles in rural regions, and bolstering new energy vehicle service management in rural areas are all essential.

From the perspective of implementation, the relevant policies for the purchase of new energy vehicles have been implemented since 2014, mainly including tax exemptions for pure electric vehicles, plug-in hybrid vehicles, etc., which are implemented by local tax authorities and are well implemented. This type of policy covers eligible new energy vehicles across the country and applies to individual and corporate users. In addition, the construction of charging facilities supported by policies is spread across urban and rural areas, especially in areas where new energy vehicles are intensively used. The relevant policies for new energy vehicles going to the countryside are mainly aimed at rural and remote areas, and the policy content covers car purchase subsidies and infrastructure construction.

In terms of enforcement strength, the three types of policies have sufficient enforcement strength, but the relevant policies for the construction of charging facilities have different progress in different regions. At the same time, the relevant policies for new energy vehicles going to the countryside are also insufficiently implemented in some remote areas.

2.2. Progress in Infrastructure Construction

According to the report of the China Society of Automotive Engineers, China's charging infrastructure construction has achieved the overall policy goals, but there are still many shortcomings and bottlenecks.

China's infrastructure system made significant progress during the 13th Five-Year Plan period, going from "nothing to something" to a charging infrastructure system that includes unit and individual charging facilities, inter-city and urban public charging and swapping networks, and dedicated charging and swapping stations. This system helped the country achieve its overall goal of "effectively supporting the promotion and use of 5 million new energy vehicles" [1]. On the other hand, China's efforts to build charging infrastructure have encountered additional challenges, including the uneven regional growth of public charging stations, inadequate backing for the extensive expansion of the private automobile industry, and the electrification of medium- and heavy-duty goods through charging and swapping.

2.3. Industry Development

China's attention to the new energy vehicle industry has increased in recent years. The industry has reached a critical point in its development, and related technologies are maturing. Vehicle technology, power battery technology, electric drive system technology, intelligent control technology, and fuel cell technology are the main components of the development of new energy vehicles. These technologies are currently at the forefront of the world and have room for further advancement [2].

China's new energy vehicle market has grown significantly in size. Less than 10,000 new energy vehicles were produced in China in 2011, while 12,500 vehicles were produced there in 2012. China has seen significant increase in new energy vehicle sales and production in recent years. Furthermore, the new energy vehicle sector in China has developed into a robust, integrated industrial chain. From the upstream processing of mineral raw materials and power batteries to the downstream production of entire vehicles, China's new energy vehicle industry has built a comprehensive industrial chain and holds a strong position in each link.

3. Analysis of the Effect of the Implementation of New Energy Vehicle Policies

3.1. Market Sales Growth Effect

The China Association of Automobile Manufacturers (CAAM) has released figures indicating that sales of new energy vehicles in China will reach 9.495 million units in 2023, with annual growth rates of 35.8% and 37.9%, respectively. China's output of new energy vehicles is expected to reach 9.587 million units in 2023. The total number of new energy vehicle sales from January to May 2024 will be 3.89 million, representing a 32.5% increase over the same period last year. Sales of new energy vehicles are expected to reach 960,000 units by May 2024, representing a 33.3% year-over-year and 12.4% month-over-month rise.

However, some academics have a favourable opinion of the impact of consumption incentive programs in the quantitative assessment of the impact of new energy vehicle legislation. Zhang Haibin and Sheng Zhaohan created an incentive model for government subsidy policies using a multi-agent approach, using tax and fiscal policies as an example. According to the study, modest government subsidies can increase market demand and foster the growth of the new energy vehicle industry [3].

In summary, the implementation of new energy vehicle policies has played a vital role in increasing the sales of new energy vehicles.

3.2. Changes in Consumer Behavior and Market Demand

Economic policies like tax breaks and subsidies for car purchases have increased consumer propensity to take environmental protection into account when making auto purchase decisions. To a certain extent, these incentives have influenced buyers to think carefully about environmental preservation while making an automobile purchase. The government's subsidies for building charging heaps and low-carbon travel discounts, for instance, have increased consumer awareness of the environmental impact of new energy cars. The development of urban infrastructure and pertinent policy guidelines by the government have improved the climate for the use of new energy vehicles

and increased associated consumption. Chen Jianfeng developed a model based on the idea of consumer perceived value and found that consumer lifestyle and citizen awareness have a major influence on the willingness to buy new energy cars. According to Mei Jiayi, through the mediating variables between consumer perceived risk and consumer perceived value, the pertinent aspects of the new energy vehicle product itself affect consumers' propensity to acquire new energy vehicle products [4].

4. Problems and Challenges in the Implementation of New Energy Vehicle Policies

4.1. Technical Bottlenecks and Cost Pressures

Technical bottlenecks will inevitably arise during the development of new energy vehicles, and costs will likely increase as well. First, there will be constraints in battery technology for new energy vehicles. Although new technologies such as solid-state batteries are being developed. As of 2023, the energy density of most batteries will be limited, affecting the driving range. At the same time, fast charging technology has not yet been popularized, and the long charging time is still a pain point for users. Cycle life is also a major pain point. Battery aging and performance degradation problems still exist. How to extend the battery life is one of the technical challenges.

Minerals like lithium, cobalt, and nickel have erratic pricing when seen through the lens of production costs. These minerals' mining and supply chain issues also contribute to cost instability. Companies are looking for alternate materials due to concerns about the environmental impact of developing new energy vehicles, but the necessary technologies are still in their infancy.

Studies have found that although the technological innovation of new energy vehicle companies in central and western China has been positively promoted by industrial policies, it is mainly reflected in design patents and utility model patents, while the increase in invention patents is significantly less than these two categories. Therefore, to ensure the balance between industrial and regional development, policy-making departments should appropriately tilt industrial policies [4].

4.2. Insufficient Infrastructure Construction

By the end of December 2023, the member units of the China Electric Vehicle Charging Infrastructure Promotion Alliance reported a total of 2.726 million public charging piles, comprising 1.203 million DC charging piles and 1.523 million AC charging piles. Additionally, the number of private charging infrastructure was close to 6 million. These figures pertain to the infrastructure for charging electric vehicles. Currently, there is a rather concentrated build of public charging infrastructure in my nation. As of the end of February 2024, seventy-one percent of the nation's public charging piles had been constructed in Guangdong, Zhejiang, Jiangsu, Shanghai, Hubei, Shandong, Beijing, Anhui, Henan, and Sichuan provinces [5]. This demonstrates that even while many provinces have made charging heaps popular and widely used, some continue to struggle with the issue of charging pile construction not keeping up with the rise in new energy vehicle usage, which makes it inconvenient for users to charge.

4.3. Policy Implementation and Regulatory Issues

The policy implementation and regulatory issues of new energy vehicles after 2023 are receiving increasing attention. The policy level has started to expand support for new energy cars, including car purchase incentives and the development of charging infrastructure, as nations increase their environmental protection regulations. However, there are a number of obstacles to the policy's execution, including local governments' varying interpretation and application of the law, which leads to an unequal distribution of resources. To further secure customer safety and trust, new energy vehicle technical standards and safety oversight also desperately need to be enhanced, particularly with regard to battery safety and environmental effect. To keep phoney propaganda and inferior goods

off the market, regulators must set up a reliable assessment system and routinely check the production and sales practices of businesses. The only way to ensure that the new energy vehicle industry develops healthily and achieves its ultimate goals of economic gains and environmental preservation is to increase policy implementation and supervision.

5. Conclusion

The aforementioned analysis shows that China's new energy vehicle market has become the largest in the world based on its impressive successes in policy backing, market sales, and technological advancement. However, a number of obstacles, such as technological hurdles, inadequate infrastructure development, and uneven policy implementation, come with the industry's rapid development. These issues limit the market's ability to grow while also negatively affecting the experience of customers. In light of the existing circumstances, the author of this essay makes the following recommendations to encourage the new energy vehicle industry's sustainable development.

To enhance the entire performance and driving experience of new energy vehicles, first lend more funding to the research and development of critical technologies, particularly those related to power batteries and quick charging. In order to guarantee the acceptance and practicality of charging sites in order to reduce range anxiety, it is also important to encourage the balanced building of charging infrastructure, particularly in rural and isolated locations. enhances policy execution and transparency, creates a strong regulatory framework, guarantees that local governments comprehend and carry out federal programs, and prevents waste and inefficient use of resources. Lastly, the government can employ a variety of strategies to push businesses and consumers to raise environmental consciousness and encourage the adoption of new energy vehicles. In addition, businesses should be encouraged to prioritise environmental preservation and develop sustainable materials during the production process in order to minimise the environmental impact of their operations. With these all-encompassing approaches, the industry for new energy vehicles can be effectively encourage.

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