

Infrastructure Investigation and Public Management Strategy of New Energy Vehicles in Tonglu County

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Abstract: The development of energy saving and new energy vehicles is the only way for China from a big automobile country to an automobile power. In order to effectively promote environmental governance, energy conservation and emission reduction work in Tonglu County, Hangzhou city, and accelerate the development of the new energy vehicle industry, the team, through a field investigation. Focus on the new energy vehicle product performance verification and production use, after-sales service, battery recycling comprehensive research. This paper summarizes the residents' understanding of the infrastructure of new energy vehicles, as well as problems existing in the new energy vehicle industry facilities in Tonglu. Thus, we will put forward the following five countermeasures and suggestions: to comprehensively improve the level of science and technology; optimize the use-end management of new energy vehicles; increase subsidies; change consumers' consumption concept; government and enterprise cooperation; promote the development of the new energy vehicle industry; strengthen the training of compound talents in five aspects to improve.

1. Introduction

1.1. Policy Background

The development of energy conservation and emission reduction and new energy vehicles is the only way for China to move from an automobile power to an automobile power. It is also a strategic measure to deal with climate change and promote green development^[1]. Automobile industry is Hangzhou further implementation of the "new manufacturing plan" key areas, Hangzhou actively uses the existing new energy automobile industry foundation, adhere to the combination of market leading and government support, popularization and application and facilities, the combination of vehicle development and parts production, industrial agglomeration and project drive, Hangzhou seizes "difference" key window of transformation and upgrading of new energy automobile industry, promote the development of new energy automobile industry with high quality, strive to achieve lane overtaking^[2].

1.1.1. The Popularity of the "Double-carbon" Concept

Based on the new development stage, we should implement the new development concept and build a new development pattern. We should maintain a systematic approach and strike a balance

between development and emission reduction, between overall and partial, and between short and medium term and long term. We should bring carbon peaking and carbon neutrality into the overall economic and social development, take the comprehensive green transformation of economic and social development as the guide, and take green and low-carbon energy development as the key. We will speed up the formation of new industries and new patterns that conserve resources and protect the environment, and unswervingly follow the path of high-quality development that prioritizes ecological, green and low-carbon development^[3].

To this end, the government has fulfilled the responsibility for energy conservation and emission reduction, and intensified its implementation. We will optimize the environment for energy conservation and emission reduction, further build a market mechanism for energy conservation and emission reduction, and establish a sound and sound management mechanism for energy conservation and emission reduction. The concept of energy saving and the consumption reduction has been gradually applied to the development of enterprises in all fields of society ^[4]. Based on the concept of "double carbon", Hangzhou attaches more importance to the development of new energy vehicles. Relevant departments should gradually expand the importance of the development of new energy vehicles, and introduce various policies to promote the development of new energy vehicles. It has promoted the effective development of energy conservation and emission reduction, intensified the publicity of energy conservation and emission reduction, and advocated a low-carbon and environmentally friendly lifestyle.

1.1.2. Tonglu Low-carbon Environmental Protection Promotion Background

In recent years, Tonglu County in Zhejiang Province has won many reputations such as "National Ecological County", "China's Most Beautiful County" and "China's Most Beautiful Village". Ecological construction and environmental protection have always been in the forefront of Zhejiang province and even the whole country. To this end, Tonglu County Environmental Protection Bureau strictly grasps the environmental protection access threshold, and vigorously develop the beautiful economy.

Focus on the implementation of the two-carbon strategy. In 2022, Tonglu County has been built into a "green city" with intensive and efficient development mode and significantly enhanced carbon emission management capacity. We will actively encourage green travel of vehicles, guided enterprises to increase the proportion of new energy vehicles, phase out more than 80% of logistics stock tricycles and fuel vehicles, sign power battery investment cooperation with enterprises, accelerate the infrastructure allocation of new energy vehicles, and rationally plan charging equipment for new energy vehicles.

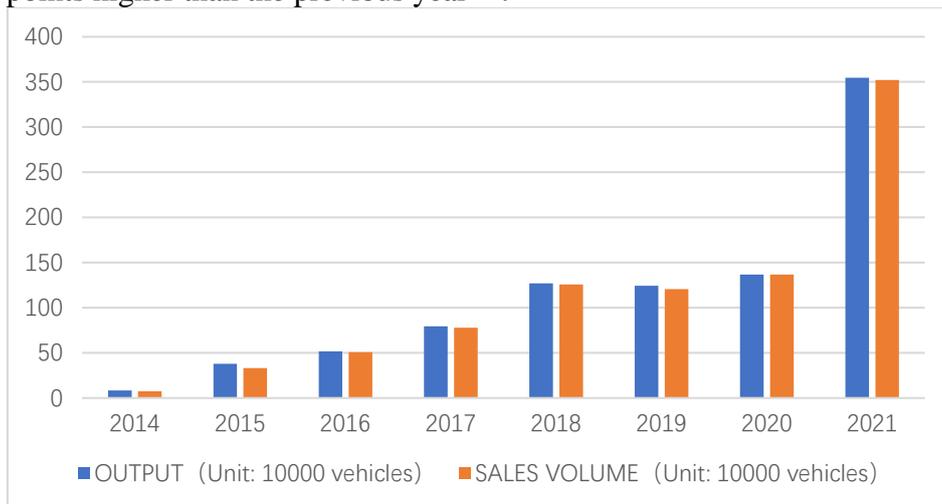
Transforming and upgrading the green standards. We should vigorously develop the beautiful economy, explore the development mode integrating ecology and economy, pay attention to releasing the huge ecological dividend of Tonglu, take "three low" (low energy consumption, low emission and low pollution) as the bottom line, take "three high" (high-end industry, high-tech enterprise, high added value of products) as the focus, take "three beauty" (beauty of production, beauty of ecology and beauty of life) as the goal, and rely on innovation to drive. We will vigorously develop strategic emerging industries such as energy conservation, environmental protection and new energy through industrial ecologicalization and ecological industrialization.

2. Situation Analysis

2.1. Current Situation Introduction

2.1.1. Current Situation of the New Energy Vehicle Industry

According to the relevant data of the National Bureau of Statistics Figure 1, the sales of new energy vehicles in China reached 3.221 million in 2021, with a year-on-year increase of 1.6 times last year. The annual output of new energy vehicles increased by 145.6%, and the market share reached 13.4%, 8 percentage points higher than the previous year ^[5].



1Figure 1: Annual Sales volume of new energy vehicles (2014-2021).

New energy vehicles have great potential, and at the same time, the infrastructure of new energy vehicles is also gradually improving and supporting it. Since 2015, China has issued a number of new energy automobile policies and measures of infrastructure construction, "about to speed up the electric vehicle charging infrastructure construction guidance", " about speed up the internal electric vehicle charging infrastructure construction notice issued for the construction of new energy vehicles infrastructure provides favorable policy support, making the new energy automobile infrastructure construction has been a great development. By the end of 2019, the number of charging piles for new energy vehicles in China had reached 1.22 million, including 520,000 public charging piles and 700,000 private charging piles. At present, the charging facilities of new energy vehicles have covered 404 cities across China, forming a charging network of "ten vertical, ten horizontal and two rings". There are more than 100 charging pile service providers. Although the development trend is good, the ratio of domestic new energy vehicles and new energy vehicles charging piles is only 3.4:1, among which the ratio with public charging piles is only 7.3:1. The vehicle pile ratio obviously fails to support the development of China's new energy vehicles, and infrastructure is still the short board restricting the development of China's new energy vehicle industry. In addition, problems such as difficult charging pile into the community, long charging time, unreasonable installation location, and unbalanced regional development also seriously affect the high-quality green development of China's new energy vehicle industry ^[6].

2.1.2. Development Situation of New Energy Vehicles in Tonglu County

In 2017, Figure 2 shows that, Tonglu was listed in the first batch of demonstration counties of urban and rural transportation integration of the Ministry of Transport. In 2018, according to the "13th Five-Year" Development Plan of Electric Vehicle Charging Facilities in Zhejiang Province ", by the

end of the 13th Five-Year Plan (the end of 2020), Hangzhou will build no less than 3,000 public charging piles. In order to ensure the convenient charging of electric vehicles and boost the popularization of electric vehicles, State Grid Zhejiang Tonglu County Power Supply Co., Ltd. actively promotes the construction of charging piles. By the end of November 2018, 198 public charging piles had been built in Tonglu, which could meet the daily flow of at least 1,500 electric vehicles. These charging and changing facilities are distributed in crowded public places, such as civic squares, tourist distribution centers, stations, scenic spots, etc., providing convenience for passing electric vehicles. Tonglu has initially established a comprehensive, three-dimensional and information-based intelligent charging network.



Figure 2: State Grid Zhejiang Tonglu County Power Supply Co., Ltd. actively promoting the construction of charging piles.

In 2021, 64 new public charging piles for new energy vehicles was added in Tonglu County, including 26 fast charging guns and 38 slow charging guns; not set in Dayi Industrial Park, South Street, Jiangnan Town, the bus station, Zhongshan Township and Zhijia bus station, Fuchun Town; slow charging guns are set at the edge of 320 National Road in Dong Village, Fuchun River Town, Left Bank Community, Chunjiang Village, Dayang Haoting Community, Hengcun Town and Linjia Apartment Community, Hengcun Town. By December 2021, the county has 44 charging stations, with a total of 545 charging guns, which has basically achieved full coverage within the county. Among the already built charging guns, there are 278 ordinary fast charging guns (including 108 bus fast charging guns), 241 ordinary slow charging guns and 26 power changing channels.

In addition, Figure 3 shows that, in early 2021, Tonglu County achieved full coverage of electric bus facilities. At present, the county has reached 213 new energy buses, the main urban area of green bus has achieved full coverage, new energy and clean energy buses accounted for 100%, bus charging piles have reached 94. Tonglu County has also completed the construction of NIO power changing station project in Tonglu service area of Chang-Shenzhen Expressway, which solves the range anxiety of new energy vehicles for the drivers.



Figure 3: Tonglu vigorously invests in pure electric urban and rural buses to realize the operation of pure electric buses.

2.2. The Current Situation of the New Energy Automobile Industry in Tonglu

2.2.1. Tonglu County New Energy Battery Recycling Mode

According to the "Notice on organizing and carrying out the pilot work of New Energy Vehicle power Battery recycling", the Ministry of Industry and Information Technology, the Ministry of Science and Technology, the Ministry of Ecology and Environment, the Ministry of Transport, the Ministry of Commerce, the State Administration for Market Regulation, the Energy Administration organized the evaluation of the implementation plan of the pilot project of new energy vehicle power battery recycling applied by relevant regions and enterprises. After research, Zhejiang province is determined to be the pilot region. We will promote the development of a recycling system in a coordinated manner. We will encourage automobile manufacturers to implement the extended producer responsibility system, establish recycling service outlets, give full play to the advantages of existing after-sales service channels, and build a regional recycling and utilization system in cooperation with enterprises that produce batteries, recycle, disassemble and comprehensively utilize scrapped vehicles. We will make information related to the recycling and utilization of power batteries public, and take measures such as buyback and trade-in of old batteries for new ones to promote the recycling of power batteries.

In the recycling process, Tonglu related enterprises adopt advanced treatment technology, and use useful substances in waste batteries such as cobalt, nickel, lead, and zinc as raw materials for production, and use them in the battery reproduction to save national resources. Thus, to maximize the harmless treatment and recycling, to achieve the "green" recycling of waste batteries. The fully enclosed automatic recycling equipment is developed. In the recycling process, the pollution caused by heavy metal cadmium, electrolyte and other harmful substances in the battery is reduced to a low extent, and the safe and harmless treatment and recycling are carried out to the greatest extent, realizing the "green" regeneration of the waste battery electronics in the true sense.

2.2.2. Tonglu County New Energy Vehicle Enterprises

Tonglu has several new energy automobile enterprises, developing development in recent years. Currently has tonglu prosperous new energy automobile co., LTD., Tonglu million new energy co., LTD., Zhejiang giant new energy automobile co., LTD., Tonglu yon wing new energy automobile service co., LTD., Tonglu, new energy technology co., LTD., Tonglu million new energy technology co., LTD., Hangzhou new energy automobile service co., LTD., Etc.

On the morning of May 7, 2022, Tonglu County signed a power battery investment and cooperation agreement with geely Technology Group. Geely Technology Group will plan to build a power battery project with an annual capacity of 12 Gh in Tonglu Economic Development Zone. Figure 4 shows that the project is planned to cover a total area of about 450 Mu, with an annual capacity of 12 Gh power battery production line and related supporting facilities. It is planned to build a new energy vehicle industry cluster with power battery industry as the core. Its battery products have excellent performance, high energy density, good safety performance, long cycle life, fast charging speed, strong temperature adaptability and other advantages.

In the new energy industry of the development zone, Ailuo Energy, Jinbei Energy, Infinite Optoelectronics, Infinite New Energy Technology is the core enterprises. The main products are solar photovoltaic panels, photovoltaic energy storage system, LED drivers, new energy charging piles, etc. It fully implements the strategy of "integration of optical storage industry chain", is committed to the establishment of global technical services and market channels, and develops into a global influential manufacturing industry cluster of optical storage system products.

In the future, Tonglu County will set up a special project team to ensure the promotion of the

project, concentrate on ensuring the implementation and construction of the project, and speed up the planning and approval of the project. This cooperation will help Tonglu County to build a provincial new energy industry cluster manufacturing highland, and promote the coordinated development of Zhejiang new energy industry chain. After the completion of the project, it is expected to attract large number of high-quality upstream and downstream enterprises in the fields of new energy vehicles, power batteries, energy technology and other fields to gather, form a high-tech industrial cluster, and promote local economic development and social employment.



Figure 4: Geely Technology Group plans to construct a power battery project in Tonglu Economic Development Zone.

2.3. Open Question

2.3.1. New Energy Technology is not Mature

The generation of high maintenance cost and high use cost is closely related to the immaturity of the new energy technology in China. China's new energy technology in the form of money to buy foreign technology, import technology not only cost a lot of money, but also reduce the efficiency of the production, can imagine mass production situation, due to the immature technology of capital loss and low efficiency is how serious, also affects the consumer trust for new energy vehicles, restricting the efficient development of the auto industry^[7]. In addition, there are also certain obstacles in the resource development technology of solar energy as the operation power and the battery range technology. There is a certain gap between the whole automobile field and foreign countries, and it takes a certain period to catch up.

2.3.2. Supporting Facilities are Relatively Backward

Car internal parts are crucial for cars, in terms of new energy vehicles, but the gap between regional development level in China, the eastern coastal areas and part of the inland industrialization level there is a big gap, the production of supporting parts is uneven, difficult to form a complete foundation of infrastructure supply chain. Secondly, the distribution and number of charging piles also seriously affects the development of new energy vehicles. According to the investigation, the distribution of charging piles is not covered on a large scale, which cannot provide fast car charging convenience. The development of infrastructure cannot keep up with the development of new energy vehicles, and the difficulty of charging restricts the purchasing behavior of consumers. Secondly, a series of problems, such as difficult charging queuing in dense business areas, unreasonable distribution of charging piles, difficult maintenance and slow maintenance speed in the later stage, all lead to the

poor experience of new energy vehicle users. Again, the after-sales insurance work of new energy vehicles is not in place. It has also become an important problem to improve the after-sales problems of new energy vehicles and improve consumers' experience. Finally, the construction cost of domestic public charging facilities covers many aspects, and the high construction cost and maintenance cost leads to the great financial burden of the government. It is difficult to solve the fundamental problem only by relying on the government support, which is the key to the above problems.

2.3.3. Lack of Special Regulations and Regulatory Measures

At present, Tonglu County government only issues administrative inspection on disposal of new energy vehicle power batteries by scrapped vehicle recycling enterprises, without clearly indicating specific punishment measures and punishment intensity, and has not yet introduced clear management policies and measures. However, there is no mandatory management and no effective constraints on enterprises. And the rights and responsibilities of producers and users are not clear from the legal level.

In the actual situation, Tonglu County currently has a relatively small scale of scrapped new-energy vehicle power batteries, and there are still no mandatory measures for the recovery of used power batteries, no strong punishment measures for violations, no clear responsibility of the main body in the recovery process, and the main responsibility is really implemented. And in the process of trade and recovery of new energy vehicles there are problems such as unreasonable prices, so that the power battery into the illegal channel phenomenon is also relatively common.

2.3.4. The Standard System Needs to be Further Improved

Although our country now appeared a lot about new energy vehicles power battery management norms and standards, the Tonglu county did not form synchronization with new energy automobile industry development, such as in the process of new energy automobile production and operation will exist in the merger / separation between enterprises, new energy vehicles for battery repair of some new problems, such as industry management system remain to be further improved. There is no unified standard for the battery appearance, lamination, winding and the form of unwinding, which leads to the difficulty of dismantling in the recovery of waste batteries and increases the recovery cost. Secondly, from the aspect of recycling system, because there is no unified storage and recycling service network, and the development of cascade utilization standards for power batteries is relatively slow. Finally, with the rapid development of the new energy vehicle industry, the existing standards need to be constantly improved, such as the diverse sizes and specifications of power batteries in the current market.

2.3.5. Lack of Relevant Talent Support

Most consumers hope that new energy vehicles have high energy efficiency, fuel saving, stable operation and low engine noise. These driving the development of new energy vehicles towards a high sense of experience are inseparable from the relevant talent reserve. New energy vehicles for the demand for talent, related technical personnel cannot fully meet the requirements of the industry, compound talent reserves to adapt to the development of new energy vehicles, however, the popularity of relevant theoretical knowledge is not high, colleges and universities on the aspect of professional teaching and its lack, and the lack of talent also restrict the development of new energy vehicles, affect its market share.

3. Countermeasures and Suggestions

The development of new energy vehicles in Tonglu County is still showing a positive trend. From the initial establishment of a comprehensive, three-dimensional, and information-based intelligent charging network to the full coverage mode of electric bus facilities realized in early 2021, the development of new energy vehicles in Tonglu County has always followed the pace of the country in the steady progress, The public is also getting more and more understanding of new energy vehicles, In the current realistic background of the rising enthusiasm for new energy vehicles. How to better combine the development of the automobile industry with the new changes, new demands and new opportunities, such as the global carbon reduction action, renewable energy development, information and intelligent technology innovation, and travel mode reform? How to better grasp the development trend of the industry, explore the industrial direction of the next stage, better respond to the challenges, and promote the development of the new energy vehicle market to a higher level? This series of problems are we need to consider, now for the problems in the survey of new energy vehicles in Tonglu County, for a new idea for the development of new energy vehicles.

3.1. Innovation, Research and Development, and Improve the Level of Science and Technology

IT is a kind of industry, technology is the most critical part, so it can be seen that technology support is particularly important. For technology, enterprises need to comprehensively improve their technological level; in addition to technology, the diversification of energy cannot be ignored^[8]. It is necessary to increase research on the fuel needed for new energy, respond to the national sustainable development strategy to produce new energy vehicles with good quality and high performance; for new energy batteries, study the characteristics of foreign batteries, continuously improve the technical level of battery production in China, and strive to improve on the cost of high energy density and storage capacity, and further improve the high range of batteries. For Tonglu County, enterprises can send relevant technical personnel to go abroad to learn relevant advanced technology and reach cooperation with foreign leading enterprises; Tonglu County government can also help enterprises connect, do a good job of bridge work, promote the formation of long-term guidance relationship between enterprises, exchange and cooperation and promote their own development.

3.2. Optimize Management and Optimize Infrastructure Construction

At present, the practicability of new energy vehicles is not very strong, which is a big problem. From the data, we can also see that consumers have great concerns about charging. In order to improve consumers' feelings of use, battery improvement and increasing the penetration rate of charging piles are of great importance. Therefore, the construction and layout of charging infrastructure can be increased. Tonglu County government needs to make a reasonable layout for the construction of public charging piles to maximize the utilization rate of charging piles. For example, it can cooperate with the underground parking garage of shopping malls to improve the uneven regional distribution of charging piles, carry out unified management of charging pile services for new energy vehicles, and integrate the charging pile services.

3.3. Policies Tailored to the City to Boost the Joint Development of Government and Enterprises

New energy vehicles in development difficulties, its efforts to break through the government also need the strong support^[9], so the Tonglu County government can make more detailed development plans for related industry, promote the establishment of a unified industry standard system and

management norms, improve the related industry management system, realize synchronization with industry development, provide power for the promotion and development of new energy vehicles. Secondly, Tonglu County government can build a sound system of new energy vehicle popularization strategy, such as layout publicity on the county website, expand the response and coverage, to help new energy vehicles occupy the market. In addition, Tonglu County government can also provide certain financial support for research and development investment, so as to encourage the automobile industry to increase research on energy-saving technology, solve better the problems existing in the research and development process of new energy vehicles, and promote long-term development. Besides the construction of charging pile too slow problem also profoundly restricts the development of new energy vehicles, the larger fiscal spending also caused some pressure to Tonglu County government, which can promote government-enterprise cooperation, attract social capital to broaden the financing channels, make up for the lack of public funds to promote the construction of charging pile, promote the overall development of new energy vehicles, and achieve a win-win development mode between enterprises.

3.4. Teach Students in Accordance with Their Aptitude, and Implement the Training of Compound Talents

In the new era of development, the demand for compound talents is also extremely urgent, and so is the new energy industry^[10]. In order to solve this problem, the introduction of relevant technical talents can be adopted. Tonglu County government and relevant new energy automobile enterprises can establish school-enterprise cooperation mode with some colleges and universities to achieve targeted training of talents, so as to ensure the skilled use of new technology and new equipment in the process of new energy automobile research and development, in order to promote the rapid development of new energy automobile industry.

3.5. Increase Subsidies to Change the National Concept of Public Travel

According to the survey, the price of new energy vehicles acceptable to consumers is between 150,000 and 300,000 yuan. Nowadays, consumers' acceptance of new energy vehicles is also gradually improving, but the action power is generally not high. Therefore, Tonglu County government can attract consumers' attention through certain financial subsidies, and increase the purchase rate from the initial low purchase cost. Through personal experience after the real understanding of its performance, over time, improve the acceptance of new energy vehicles; In addition, it is also necessary for Tonglu government and relevant media to strengthen publicity, and stimulate people's desire to buy new energy vehicles by widely publicizing the advantages of new energy vehicles.

4. Conclusion

In terms of market application and prospects, new energy vehicles still have great advantages. Based on their own pollution-free, low cost and strong policy support given by the national government, new energy vehicles at home and abroad will be highly recognized and promoted in the market sooner or later, and truly replace fuel vehicles to popularize every household.

In a word, China's current new energy vehicles development should break the original development is not comprehensive rigidity, fully develop its own advantages, combined with the conditions of new energy automobile industry development, effective use of government policy support and market demand, fully innovation and break through the original technical problems, form the new energy automobile market mechanism, actively build all aspects of the cloud industry

development space, so as to realize the long-term development of new energy automobile industry in our country, promote the sustainable development of green economy in our country.

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