Analysis of Response of China New Energy Vehicle Markets to Government Policies
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Abstract
Based on the self-developed database, China Electric Vehicle Market Database, the market response of energy-saving and new-energy vehicles (NEV) to policies is analysed from the year of 2005 to 2014. After the Energy Saving &New Energy Vehicle Key Project was approved in 2006, the production of new energy buses in 2007 was fifty-six times as many as that in 2006, and reached 2,000 in 2009. The NEV largely Demo & Deploy Project, the 12th Science & Tech. Development and the subsidy of domestic vehicle purchase were initiated during 2009 to 2010. In 2012, the production of hybrid and battery electric buses and passenger cars is twice as that in 2011, especially the passenger cars, which is 2.6 times as that in 2011 with more fiscal taxation policies promoted. Subsidy for electric buses changed in 2013. Hybrid electric bus (HEB) subsidy was cancelled and Plug-in hybrid electric bus (PHEB) subsidy was retained. Therefore only 460 HEBs were manufactured in the first half of 2014, which is just 7% of 2013. Meanwhile, the production of PHEBs increased fast, reaching 3900 in the first half of 2014, which is more than 2013. China has designed policies to stimulate consumer acceptance and accelerate market adoption. There was a series of incentive policies on charging infrastructure and power prices released in 2014 which will promote a remarkable increase in production. Thus market response to government policies shows that policies have a major influence on the development of new energy vehicle. On one hand, incentive policies can promote the penetration of new energy vehicles; on the other hand, the policies need to be more comprehensive and continuous.

Keywords: New Energy Vehicle, Policies, market, production

1 Introduction
With the high demand of oil, the limited petroleum reserve is becoming a hot topic. In the meantime, the environmental pollution of haze weather has also draw more attention. China, as one of the largest petroleum importing countries, is eager to find a way to change the energy structure, reduce the reliability of petroleum and improve air environment. The rising sales in Chinese auto market leads to dramatically demands of petrol usage. And automobile exhaust is the main factor that causes environmental problems. The New Energy Vehicle (NEV) has absolutely advantages in reducing emission and fuel consumption. Therefore, developing NEVs is
the key to improve the environmental quality and ease oil addiction. In addition, intelligent, networked and automation are the trends in the automobile industry. Meanwhile, Electric Vehicle (EV) is the best carrier to achieve those goals. As a result, to promote the development of NEV in China will make a great contribution to energy and environment as well as the key path to being a powerful country in automobile industry.

Chinese government announced a series of polices in science and technology, subsidy, tax, reward of infrastructure etc from 2001, as shown in table 1. NEV promotion has been raised as the National Strategy. With the powerful supports from Chinese government, the NEV markets has an enormously development.

<table>
<thead>
<tr>
<th>YEAR</th>
<th>MONTH</th>
<th>INSTITUTION</th>
<th>NAME OF POLICES</th>
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<tr>
<td>2001</td>
<td>October</td>
<td>MOST</td>
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<td>12th FYP Science &amp; Tech. Development Plan</td>
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<td>Notice on Bus Purchase tax free for city-bus enterprise</td>
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<td>12th FYP The Strategic Newly Arisen Industry Development Plan</td>
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<td>Notice on the price of electricity for electric vehicle</td>
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<td>Notice on Purchase tax Free for NEV</td>
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<td>Temporary Provisions About New BEV Enterprises Investment and Producing Access Management(draft)</td>
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This paper analysed response of China new energy vehicle markets to government policies based on “China Electric Vehicle Market Database” built by State Key Laboratory of Automotive Safety and Energy of Tsinghua University.

Here is the terminology used in this paper:
- HEV - Hybrid Electric Vehicle
- PEV - Plug-in Electric Vehicle
- BEV - Battery Electric Vehicle
- PHEV - Plug-in Hybrid Electric Vehicle
- NEV - New Energy Vehicle
- FCV - Fuel Cell Vehicle
- MIIT - Ministry of Industry and Information Technology of PRC
- NDRC - National Development and Reform Commission of PRC
- MOF - Ministry of Finance of PRC
- MOST - Ministry of Science and Technology of PRC
- SAOT - State Administration of Taxation of PRC
- NGOA - National Government Offices Administration of PRC

## 2 Policies of New Energy Vehicle in China

In 2001, electric vehicle became one of 12 key Science and Technology Project during the 10th Five-year Plan (FYP). The “3-vertical and 3-horizontal” technical layout was built, which meant that the developing trend of research and industry was confirmed in the future. The “3-vertical” covered Fuel Cell Vehicle (FCV), Hybrid Electric Vehicle (HEV) and Battery Electric Vehicle (BEV). The “3-horizontal” covered vehicle control system, driving motor system and power battery system.

In 2006, the Key Science and Technology Project of Energy Saving & New Energy Vehicle was approved during the 11th FYP. The project cost 7.5 billion Yuan. 432 units including domestic vehicle and parts enterprises and 14.6 thousand scientists and engineers participate in the research, which established an innovation system of research and development in electric vehicle field.

“Ten Cities One Thousand” program was launched, with 13 cities determined to be pilot demonstration cities in 2009 and 12 cities in 2010. Ministry of Science and Technology of PRC issued “12th FYP Science & Tech. Development Plan” in July 2011 and “Key Science and Technology Plan of Electric Vehicle in the 12th FYP” in March 2012, in which the “Electric-drive” strategy was established.

China State Council released “Energy saving & new energy vehicle medium- & long-term development plan” in June 2012 and “12th FYP Strategic Newly Arisen Industry Development Plan” in July 2012. The plan built industrial target and fuel consumption target. The industrial target is that the accumulated sales of PEVs would reach 500 thousand in the end of 2015 and 5 million in the end of 2020. And the fuel consumption target is that the fleet average fuel consumption would be 5.9 L/100km in 2015 and 5.0L/100Km in 2020.

In July 2014, China state council issued “Instruction on Accelerating NEV Promotion”. It was the most comprehensive and systematic policy in NEV Promotion. After that, many policies were published including price of electricity, purchase tax, reward of infrastructure and enterprises access. Major policies from 2001 to 2014 are shown in Table 1.

### 2.1 Fiscal and Tax Preferential Policies

#### 2.1.1 Fiscal Incentives in China

Subsidy policy in January 2009 was released for the transit buses of 13 cities in “ten cities thousand vehicle” pilot demonstration program. Every BEV bus could obtain 500,000RMB. HEV buses could obtain 50,000 RMB~420,000RMB determined by fuel saving ratio, maximum electric power rate and battery type. The fuel saving ratio is the percentage...
of fuel that could be saved by an NEV compared with the conventional equivalent model built by the same manufacturer. For parallel hybrids, the maximum electric power rate stands for maximum motor power divided by the sum of rated engine power and maximum motor power. The maximum motor power is estimated by multiplying the rated motor power with a coefficient. For series hybrids, the maximum electric power ratio is considered to be 100%.

The higher the fuel saving ratio and maximum electric power rate is, the more subsidies can be obtained. 12 cities were added to pilot demonstration program in 2010, increasing the total number of cities to 25. In May, NEV Private Purchase Subsidy Pilot Program was issued that subsidy amount was determined by battery capacity, which is not less than 15kwh (BEV car) and 10kwh/50km E-drive range (PHEV car). Private Customers could get 3,000RMB per kwh, up to 60,000RMB (BEV car) or 50,000RMB (PHEV car). NEV car with lead-acid battery was not in the subsidy range.

In September 2013, the government initiated subsidy phase II (2013~2015). The subsidy covered BEV, PHEV, and FCV. HEV did not qualify to the subsidy standard. The basis of subsidy amount was adjusted from fuel saving ratio and maximum electric power rate to length for PEV bus, from battery capacity to E-drive range for PEV car. In addition, BEV bus with super-capacitor and fast-charging battery can get 150,000RMB. For FCV, the subsidy is 200,000RMB (FCV car) and 500,000YUAN (FCV BUS). In January 2014, government announced that adjust the Phase-out mechanism, form 10% in 2014 and 20% in 2015 to 5% in 2014 and 10% in 2015.

2.1.2 Tax Incentives in China

Vehicle and vessel tax. Ministry of Finance, State Administration of Taxation, the Ministry of Industry and Information Technology in March 2012 issued "Notice on vehicle and vessel tax for new energy vehicle and vessel." From January 1, 2012, halved tax to energy-saving travel; free the tax to new energy vehicles and vessels.

Corporate income tax, Business tax. In July 2014, the State Council issued the "Instruction on Accelerating NEV Promotion." Energy-saving and new energy vehicles and key parts enterprises, which have been determined to obtain high-tech enterprise income tax qualified, can enjoy preferential policies in corporate income tax. Energy-saving and new energy vehicles and key parts enterprises engaged in income technology development, transfer and related consulting services business achieved can enjoy business tax exemption policy according to the provisions

**Purchase tax.** Ministry of Finance, State Administration of Taxation, the Ministry of Industry and Information Technology in August released the "notice on Purchase tax Free for NEV" in 2014, which said that from September 1, 2014 to December 31, 2017, purchase tax of new energy vehicles is free.

![Figure 1: conversation ratio in Infrastructure reward program](image1.png)

![Figure 2: key areas of air pollution control](image2.png)

![Figure 3: other cities in demonstration project](image3.png)
Consumption tax. Raise the consumption tax of oil. And EVs are not in the scope of consumption tax levy.

2.2 Other Incentive Policies

Infrastructure reward. In November 2014, the government established an Infrastructure reward program for cities in demonstration project. The amount of the reward was determined by the quantity of PEVs and FCVs, which need to be converted into BEV car. The conversion ratio and reward amount are here (Fig.1,2,3). The conversion ratio of BEV fast-charging bus is 20, which means that one BEV fast-charging bus is equal to twenty BEV cars. Meanwhile, the minimum number to get rewards and the highest reward that cities can get will increase year by year.

New NEVs ratio targets. Cities in NEV demonstration program were required that the NEVs cannot less than 30% of new added vehicles in public service. The proportion of new NEVs need to be higher 30% in all new vehicles bought by China's State Organs and NEV demonstration cities organs. The proportion in other offices was required not more than 10% (15% in key areas of air pollution control) in 2014, 20% in 2015 and 30% in 2016.

Incentives of using NEVs. Each city in China designed different incentive policies to make a more convenient environment for using NEVs than conventional vehicles to attract customers to buy or use NEVs. In many cities, such as Beijing and Shanghai, there are limits in vehicle purchase because of the terrible air environment and serious traffic jam. People in these cities must take part in the vehicle license plate lottery or auction to obtain purchase permit. The ratio of lottery in Beijing for PEVs is nearly 100%, with that for CVs is just about 1%. In Shanghai, PEV consumers can get a license plate for free, which usually costs CV consumers nearly 80,000 Yuan. Some cities are planning certain roads or parking spaces that only PEVs can use.

3 China New Energy Vehicle Market

3.1 China Electric Vehicle Market Database

After years of development, China NEVs industry has began to take shape. But there is no specialized database to record NEV’s information and production. Thus State Key Laboratory of Automotive Safety and Energy of Tsinghua University developed the “China Electric Vehicle Market Database”. The data source is from China Macro Industry Database (monthly all vehicles’ production), China Automotive Information Net (monthly certain vehicle’s production) and China car Net (certain vehicle’s parameters). The database was established on OFFICE EXCEL platform so that VBA language can be used to process the data, which contents the monthly production of HEV, BEV and PHEV, and their parameters information, such as curb weight, length, height, width, battery type and so on.[9]

3.2 China Electric Vehicle Market

3.2.1 Accumulative Production of HEV and NEV

Fig.4 illustrates the cumulative production of BEV/PHEV/HEV. The cumulative production of NEV and HEV is nearly 200,000 from 2005 to the end of 2014. BEV car represented 21% of the HEV and NEV cumulative production by the end of 2011, 29% by the end of 2012, 34% by the end of 2013, 40% by the end of 2014, which rise steadily of 5%~6% per year. HEV car and HEV bus proportion declined year by year. There was a dramatic jump of 107% from 94,000 to 194,000 in the cumulative production of NEV and HEV in 2014. The growth rate was 100% in 2010, 77% in 2011, 97% in 2012 and, 60% in 2013. Policies were released frequently in 2010, 2012 and 2014, which are the top three growth rate years.
Figure 4: accumulative production of HEV and NEV in China

Figure 5: yearly production of HEV and BEV in China
3.2.2 Yearly Production of HEV and NEV

It can be seen from Fig. 5 that production of NEV and HEV increased fast from 2005. The production of HEV and BEV in 2014 is 2.5 times than that in 2013 and more than the sum production from 2005 to 2014. Proportions of different type vehicle proportion in the different yearly productions are various. In 2010, HEV bus represented the highest proportion. And then it declined year by year. PHEV car was the latest NEV type to enter the market, but it was also the fastest one in growing. The proportion of it was the second top in 2014.

3.2.3 Passenger Vehicle Market

The first NEV entering Chinese market was a HEV car. The number of NEV car was about zero from 2005 to 2009, not counting HEV car. After private market opened to NEV in 2010, the NEV car began to grow. By the end of 2013, 30,000 BEV cars were produced, which cost four years. At the beginning of 2014, large numbers of PHEV cars entered market. PHEV car have good fuel-saving ability and costs lower in obtaining vehicle license plate. Its proportion in NEV and HEV car market was 27% in 2014 exceeding HEV car. Another remarkable increase in 2014 happened on BEV car. Its production is 45,426, three times as many as that in 2013, which just cost one year.

3.2.4 Commercial vehicle market

The cumulative production of BEV bus, PHEV bus and HEV bus has reached 58,000. BEV bus was 18,000. PEHV bus was 18,000. HEV bus was 22,000. In 2010, the production of NEV bus is 2010, which was ten times than that in 2007. The gains were boosted by the demonstration program “Ten Cities One Thousand” during 11th FTP. HEV bus was the major of NEVs bus and its yearly production increased steadily before the subsidy phase II was released in 2013 which pointed that HEV bus would no longer be entitled to the subsidy. In 2014, PHEV bus became the largest proportion in NEV and HEV bus market instead of HEV bus. The share of NEV in 2014 was 5.2% in the bus market and nearly 20% in large bus market.

4 Summary

Nowadays market of new energy vehicle in China has strong upward momentum. But it is still a tough work to achieve the target of 500 thousand in 2015. China's new energy vehicle market is still immature. It depended on government deeply, which is much more sensitive to policies than conventional cars. The production scale of China's new energy vehicles is also very small, resulting in cost is difficult to decline. It would be a great blow to China’s NEV market if the current government subsidies were cancelled. Constantly incentives played a really important role to promote industrial breeding and to achieve the small-scale production. But it is unpractical that relying solely on long-lasting financial subsidies to accomplish long-term development of new energy vehicles. The government will have enormous financial pressure. The Chinese government is also seeking new management methods, such as corporate average fuel consumption or carbon management transaction management, etc., to give companies psychological expectations of a long-term production and sales of new energy vehicles with "punishment plus reward" double-effect.
management practices to promote NEV companies to continue producing electric vehicles. Government need to develop the ability of market instead of administrative means to promote mass production of NEV. The NEV companies should take advantages of the generous policy environment and seize the opportunity of China's new energy vehicle development. The use of new technology cooperation and business model will gradually expand its production scale and eventually get rid of dependence on the policy.

Acknowledgments
This work was supported by Ministry of Science and Technology of China, under Contract Nos. 2011DFA60650, 2012DFA81190, 2014DFG71590, 2013BAG06B02 and 2013BAG06B04.

References


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