

# Low Carbon Automobile in China: Policy Frontier and Prospects Forecast

Summary Report

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The development of automobile industry has tremendous impact on China's economic growth and social development. Since the mid-20<sup>th</sup> century, China's automobile industry has made the first step, and now it has become one of the important pillar industries in national economy. China's car market has also become the world's largest car market, where major car manufacturers from various countries are competing with each other. The "Automobile Era" is drawing near.

## **I. The Economic Effects of Automobile Industry**

The automobile industry has direct and indirect effects on national economy and social development. The direct economic effect is manifested by its contribution to GDP, employment and tax revenue. The indirect economic effect is manifested by the correlation effect in other industries which has been induced by the automobile industry.

### **1. Direct Economic Effect**

**(1) Its contribution to GDP.** As a pillar industry of national economy, the automobile industry has made ever-increasing contribution to China's economic development. According to statistical data, the economic contribution rates of the automobile industry's

added value from 1991 to 2008 have shown the following characteristics: i. The growth of China's automobile industry is significantly higher than China's overall industrial growth and GDP growth. The proportion of automobile industry's added value in GDP is increasing year by year (from 0.78% in 1991 to 1.36% in 2008, with an average annual growth rate of 6.06%), which shows that the scale of automobile industry is expanding and its influence in national economy is gradually increasing. ii. The growth elasticity of China's automobile industry from 2001 to 2007 was 0.28, which shows that on average for every unit of increase in automobile industry's added value, the national economy will increase by 0.28 unit. The growth of automobile industry spurs significant growth in national economy. The project group holds the opinion that during the "11<sup>th</sup> Five Year Plan" period, the growth of China's automobile industry had reached a peak. During the next Five Year Plan period, the direct contribution of automobile industry to the growth of national economy will become stable. Its annual growth rate will be approximately 20%-30%, and the proportion of automobile industry's added value in GDP will be around 1.5%.

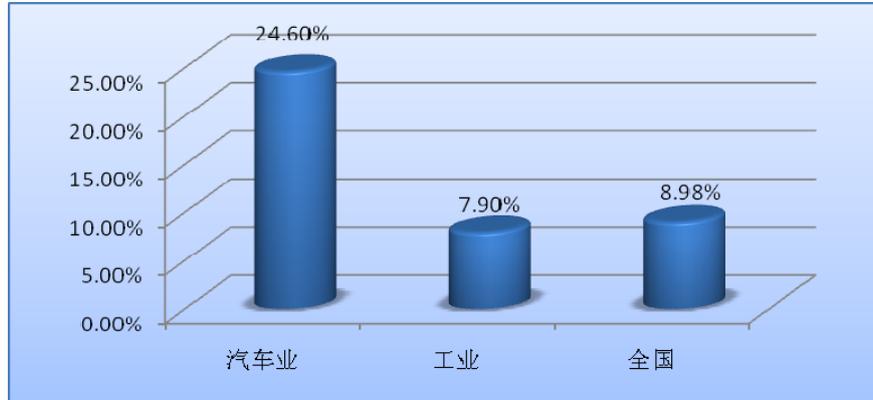


Figure 1 Growth Rates of China's Automobile Industry, Industry as a Whole and GDP in 2009

**(2) Its Contribution to Employment.** China's automobile industry is characterized by its huge employment capacity. The year-end number of people employed in China's automobile industry increased from 1.7 million in 1991 to 2.07 million in 2008, which accounted for approximately 1% of the total number of people employed in the secondary industry, and about 2% of the total number of people employed in the manufacturing industry. The numbers showed an upward tendency. The employment elasticity of

China's automobile industry from 2001 to 2008 was 0.374. The project group holds the opinion that during the next five years, the contribution of automobile industry to employment will remain 2.5 million to 3 million, and tends to be stabilized.

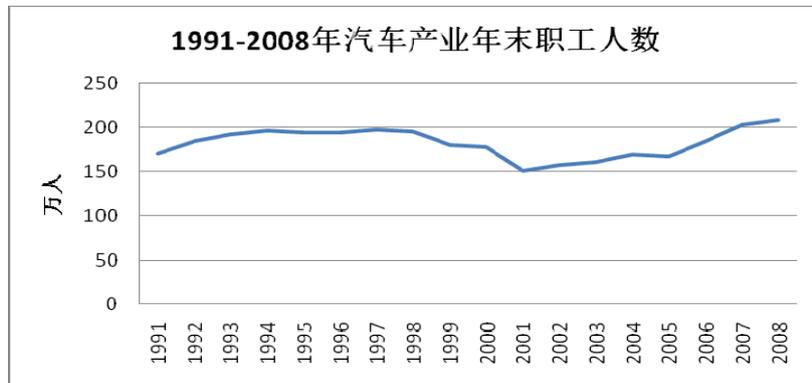


Figure 2 Year-end Numbers of People Employed in Automobile Industry from 1991 to 2008

**(3)Its Contribution to Tax Revenue.** The contribution of China's automobile industry to the tax revenue has played an important role in the machinery sector. Since 1991, the proportion of the total profits and tax of automobile industry in that of the machinery sector as a whole has remained above 20% (with very few exceptions). In most of the years except 2008, its tax contribution grows in double digits. During the next five years, the total profits and tax of automobile industry will account for approximately 20% of the total profit and tax of the machinery sector as a whole.

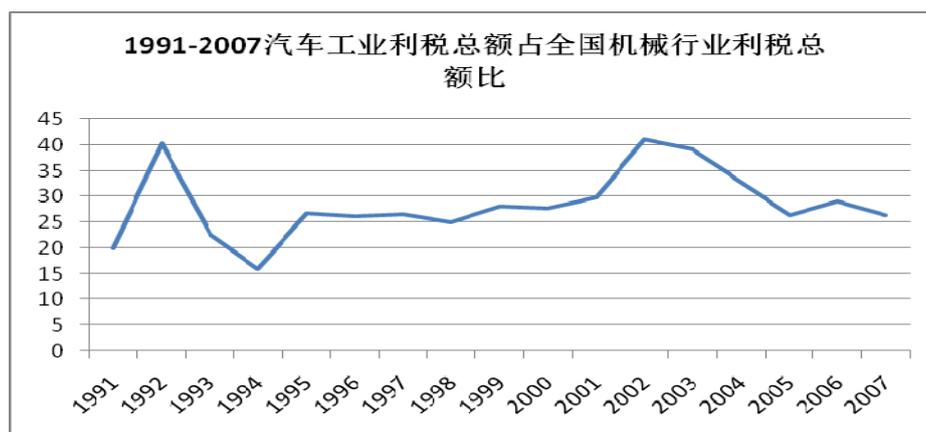


Figure 3 Proportions of the Total Profits and Tax of Automobile Industry in That of the Machinery Sector from 1991 to 2007

## 2. Indirect Economic Effect

The automobile industry involves long upper stream and lower stream industrial chain, and has direct, indirect, forward and backward connections with more than 100 related sectors. The forward connected sectors of the automobile industry mainly include raw material, equipment manufacturing, energy, machinery, electronics and textile sectors, etc. It is estimated that the full demand for the main upper stream sectors created by China's automobile industry accounts for approximately 92%~94% of the gross output of the automobile industry. The ratio between the added value induced by such full demand and the added value of automobile industry is 2.26. In the next five years, the spread effect of automobile industry will remain stable.

**Table 1 Spread Effect of Automobile Industry**

Industrial Sectors	Spread Effect	Industrial Sectors	Spread Effect
<b>Metal Smelting &amp; Refining</b>	0.279	<b>Electricity and Steam Production and Distribution</b>	0.0597
<b>Chemical Industry</b>	0.178	<b>Electronics &amp; Communication</b>	0.0273
<b>Mechanical Industry</b>	0.089	<b>Equipment Manufacturing</b>	
<b>Metal Products</b>	0.070	<b>Cargo Transportation and Storage</b>	0.0643
		<b>Non-metal Mineral Products</b>	0.0659

The backward connected sectors of the automobile industry mainly include sales industry, service industry, transportation industry, highway industry and construction industry. With the gradual development of automobile industry, this indirect effect has shown a growing tendency. The contribution rate of automobile industry to the growth of service industry from 1978 to 2008 was 36.9%, spurring the service industry to grow by 9.3%. The output elasticity for GDP, industry and service sector of the automobile industry from 2001 to 2008 was respectively 0.708, 0.683 and 0.574, reflecting a growing indirect

effect of the automobile industry. Judging from the present situation, the driving effect of automobile industry on service industry has not been fully manifested. A series of service sectors related to automobile industry, such as car finance, insurance, advertisement, car rental, driver training, car maintenance, car rescue, car beautification, gas station, parking lot, and car travel, etc., are still at infant stage so far as their position in urban economy and development status are concerned. In the future, with the development of urban economy and city cluster, the driving effect of automobile industry on service industry will be focused on this field.

## **II. The Policy Influence of Automobile Industry**

The policies of automobile industry mainly include a combination of industrial, energy, environmental and transportation policies which are related to automobile.

### **1. Automotive Industrial Policy**

Generally speaking, China's automotive industrial policy is still in constant transitions. Since 1980s, China's automotive industrial policy has gone through transitions from "government dominated" to "government guided", "from administrative intervention" to "administration + market", and transition from "emphasizing production" to "laying equal stress on production and consumption". Currently, our country's automotive industrial policy involves areas such as manufacturing, commerce, energy, environment, and urban transportation, and its policy content covers various aspects such as market competition, independent development and innovation, financial service, consumption, taxation and import & export. Centering around the manufacturing, consumption and use of cars, the automotive industrial policy has preliminarily formed a systematic scheme which is characterized by systematic guidance, management and coordination.

However, the industrial policy is still facing many problems and challenges, for example, thinking too much of production, but too little of consumption; attaching too much importance on structure, but too little on market; thinking too much of construction, but too little of operation; attaching too much importance on results, but too little on schemes;

“market in exchange for technology”, and striving too much for size and scale, etc. These problems have constrained the effectiveness of the industrial policy.

In the future, our country’s automotive industrial policy will go through further transitions, that is, a gradual transition from facing industrial structure to facing industrial organizations; a transition from merely emphasizing production and structural progress to emphasizing market competition and order; a transition from merely emphasizing production capacity to attaching more importance on key technology and new technological field; a transition from mere reliance on governmental administrative power to a socially coordinated governance scheme; a transition from pure industrial policy to comprehensive and systematic policies involving industrial, consumption, environmental, energy and transportation policies; a transition from simple policy guidance to combined policy incentives and instruments, and a transition from pure production area to the area of consumption and use .

## **2. Energy Policy**

The development objective for the energy program during China’s 12<sup>th</sup> Five Year Plan is to further strengthen oil energy saving and substitution. Clean coal, petrol coke and natural gas will be used to replace fuel oil (light oil); fuel economy standard and supporting policies will be implemented; clean car action plan shall be launched; hybrid powered cars will be developed; gas-powered and electric powered cars will be popularized in urban bus and taxi industry, etc. The project group believes that the total energy production and consumption are closely related to the growth of national economy, and will reach a steady state as the national economic growth slows down during the 12<sup>th</sup> Five Year Plan. Its impact on the automobile industry will be mainly reflected in energy price, resource tax and car tax policy.

**(1) The Impact of Energy Price.** Considering future trends, our country’s existing oil pricing and management system will not undergo major changes. Since 70% of our country’s energy supplies are relied upon import, the current energy market price is basically determined by international market, with little room left for domestic price adjustment. After the government controls such major factors as timing of oil pricing and

extent of price volatility, it may leave some room for price adjustment to enterprises which shall have some leeway to adjust price. Judging from the trend in oil price volatility, currently our country's fuel oil price has reached historically high level, and has always been rising. It is estimated that in the future our country's oil price will continue to remain significantly higher than market competitive price, and this trend will not change in the short term. The fuel oil price will have an impact on the consumption and use of car, and will further increase the cost of using a fuel-powered car. Electricity price is an important factor in the cost of a new energy concept car. In the future, electricity price will have a rising momentum in the short run, but the range for price increase will not be wide. Therefore, the cost of using a conventional fuel powered car will be further leveraged, and the new energy car will have broad development prospect owing to its comparative advantage in electricity price.

**(2) The Impact of Resource Tax and Carbon Tax Policy.** In June 2010, the resource tax reform was first initiated in Xinjiang Province, where the resource tax for oil and natural gas were changed from quantity tax to ad valorem tax. The resource tax reform has been included in the agenda of the 12<sup>th</sup> Five Year Plan. But resource tax reform will not be accomplished at one stroke, and the impact of resource tax on the resource price mainly depends on the elasticity of supply and demand. Since the impact on resource production enterprises in regions where resource tax is levied and where it is not are different, the pilot reform is still very limited. The project group holds that in the future uniform implementation of resource tax throughout the country will be an important prerequisite for the effective implementation of resource tax reform. After resource tax is levied, the production cost of automobile industry will rise, which will promote further resource integration among manufacturers in the automobile industry. Carbon tax is an important content in the 12<sup>th</sup> Five Year Plan. Research on carbon tax is being conducted, and no conclusion has been reached on whether carbon tax should be levied. On the whole, carbon tax may be incorporated into environmental tax, consumption tax or resource tax. No matter into which tax it is incorporated, carbon tax will have significant impact on energy consumption. The project group holds that everything else being unchanged, the levy of carbon tax will bring down energy consumption, and will urge energy producers and consumers to seek substitutes. Judging from the overall

governmental tax revenue, currently the government's fiscal revenue accounts for approximately 20% of the GDP, and the tax macro-incidence has reached about 30% (This is controversial). To blindly levy a new tax will not be conducive to the sustainable development of national economy and society. A possible future option may be to levy a new tax, such as carbon tax, while at the same time lower other taxes, such as consumption tax and personal (corporate) income tax, etc. This will reach a new equilibrium. Another possible option is to adjust the structure of value-added tax (VAT), i.e., to increase the tax rate for energy-intensified products, and lower the tax rate for non-energy-intensified products. Therefore, given this condition, the project group holds that the levy of carbon tax will have an impact on manufacturers, and to some extent increased their production cost. Its impact on consumption and utilization is limited.

**(3) The Vehicle and Vessel Tax Reform.** On February 25, 2011, the new Law of the People's Republic of China on Vehicle and Vessel Tax was passed. This law regulates that tax shall be levied on a passenger vehicle based on its engine displacement. It also regulates that the vehicle and vessel tax may be lowered or exempted for energy saving or new energy vehicles or vessels. The preferential tax treatment provides a relatively lenient market environment for new energy vehicle in its infant stage, and indirectly encourages the development of new energy vehicle.

On the whole, the tightening of energy policy is a trend in the 12<sup>th</sup> Five Year Plan. This signal will make future energy and resource price remain at a relatively high level. Given the existing technological conditions, the production and consumption of fuel powered vehicles will face a "high cost" era in the future.

### **3. Environmental Policy**

In policy areas which are concerned with the automobile industry, the newly unveiled The 12<sup>th</sup> Five Year Plan on National Environmental Protection (exposure draft) proposed that the emission standard system for atmospheric pollutant from moving sources will be further improved and perfected. It also raised the requirements for vehicle's tail gas emission standard, technological regulations and administrative supervision. The project group holds that in the future the impact of environmental policy on the automobile

industry will be focused on the following aspects, such as vehicle tail gas emission, the improvement of fuel oil utilization efficiency and the encouragement of development and utilization of new energy powered vehicles. The last two aspects are supportive, while the first aspect is the key factor. Controlling vehicle's tail gas emission standard, normalizing annual vehicle inspection and strengthening vehicle tail gas emission inspection, etc. will, to some extent, increase the cost of entry for the automobile industry, and will raise its entry threshold. The project group holds that in the future as the environmental policy tends to be more and more stringent, the tail gas emission standard will be gradually improved, which will have certain impact on our country's automobile industry. (1) The tail gas emission standard will help to form a new "green barrier", which will raise the entry threshold and industrial technological requirement, and increase the technological development cost for both newcomers and incumbent manufacturers; (2) the improvement of standards will help to optimize the market structure of the automobile industry, and the fittest will survive.

#### **4. Transportation Policy**

In the future China's transportation policy will still be focused on solving the basic problems of transportation and traveling. An important issue in the 12<sup>th</sup> Five Year Plan period is how to form a convenient, efficient, and low-logistic-cost transportation and traveling network within a city, between urban and rural area, and between cities and regions. The impact of transportation policy on the automobile industry will mainly be reflected in the consumption and utilization of vehicles. It is mainly manifested in various objective and subjective factors, for example, whether the transportation facilities within a city and between cities and regions are convenient, as well as traveling cost and availability of alternative means of transportation, etc.

**(1) Toll Road System.** The biggest problem facing the existing toll road system is that public interest has been taken by a small interest group. The toll road system was initially used as an important means of financing to promote road construction, but thereafter it has been transformed by local governments into an important way of seeking high profits. The phenomenon of illegal toll collection has hindered the development of automobile

industry and is not conducive to the extension of automotive industrial chain.

Under the condition that the existing institutional structure remains unchanged, the toll road system will continue to exist. It will further increase the cost of using a car, and will hinder the automobile industry from further boosting the service industry. The project group holds that eliminating the toll road system and lowering the logistic and traveling cost in our country will be an inevitable future trend. However, since the institutional barriers are still relatively high, it is difficult to solve this problem in the near future. Therefore, a feasible plan in the next five years will be making innovations on toll instruments, regulating toll standards, gradually reducing the number of toll stations and reducing time loss caused by toll collection.

**(2) Vehicle Quantity Control and Driving Restriction Policy.** Currently vehicle quantity control and driving restriction policy is an expedient measure and hard choice which several super cities, such as Beijing and Shanghai, have adopted in order to relieve traffic jams. The government is facing a dilemma, i.e., the consumption of vehicles will bring more economic income, but excessive vehicles utilization will create traffic jams. The driving restriction policy cannot suppress vehicle consumption in order to fundamentally solve the urban traffic problem. On the contrary, driving restriction policy may cause the problem of excessive vehicle consumption by car owners. A lot of arguments have been put forward, which shows that driving restriction based on the last digit of a vehicle's license plate number indirectly spurs vehicle consumption. The restricted vehicle purchase and driving restriction policy is, to some extent, unconducive to the development of automobile industry, and may not be able to solve the traffic problem. The networking, facilitation and acceleration of rail traffic provide high quality transportation facilities for normal (morning and afternoon peak hours) movement of urban population. Although there are many problems and conflict in terms of rail traffic operation and transfer in our country, the project group holds that in the future the construction of urban public transportation system in which rail traffic plays a leading role will be the primary method to solve the traffic problem in big cities of our country. In the future the car utilization cost in super cities will rise steadily, for example, the levy of traffic jam tax, and the increase of parking fee, etc. This will, to a certain extent,

restrict the use of cars for short distance travel. The project group holds that compared to purchase restriction and driving restriction policies in urban area, these influence will cause urban residents to choose more efficient means of transportation according to different purposes of making a journey. This will, to a certain extent, improve the utilization efficiency of vehicles.

### **III. Cost- Benefit Analysis for New Energy Vehicles**

New energy vehicle is the inevitable trend in the development of automobile industry. Currently the preliminary draft of the 12<sup>th</sup> Five Year Plan for automobile industry has been formulated, which sets a general objective for the development of automobile industry, i.e., to transform China from a country with a “large” automobile industry into a country with a “strong” automobile industry. The plan establishes a development path and objective which involves electric vehicle, hybrid powered vehicle and fuel cell vehicles. The 12<sup>th</sup> Five Year Plan period will be a period of product generation change and industry upgrading which is characterized by the combination of two major technologies, electronic control and hybrid power.

#### **1. Development Trend for New Energy Vehicles**

**(1) Electric Vehicle.** The preliminary draft of the 12<sup>th</sup> Five Year Plan for the scientific and technological development of electric vehicle (hereinafter referred to as the “Plan”) has raised the development strategy of electric vehicle from the level of enterprise and industrial strategy to the level of national strategy. Guided by the overall principle that parallel interaction and mutual development of “transition and transformation” of energy saving and new energy vehicles should be insisted, the technological transformation strategy of “vehicle power electrification” is further established. The priority is to develop electric vehicles with high electrification level. The government should be involved to cultivate emerging industry, and strive to meet the objective of catching up with international advanced level (In 2015, the inventory of electric vehicles will reach a million).

**(2) Hybrid-Powered Vehicle.** The “Plan” is devoted to promote the industrialized technological development and large-scale industrialization of various kinds of hybrid-powered vehicles. Given the huge market demand for hybrid-powered vehicles, the industrialized R&D of a series of hybrid-powered vehicles shall be conducted, and the development of energy saving and environmental friendly engine and electrification technology shall be combined. The priority is to achieve breakthrough in price performance ratio and foster market competitiveness.

**(3) Fuel Cell Vehicle.** During the 12<sup>th</sup> Five Year Plan period, our country will lay stress on conquering a series of cutting-edge, high-end and difficult technological problems which are represented by advanced fuel cell/new type power cell, next generation motor drive, complex electromechanical coupling, etc. Considering the need for the development of fuel cell vehicle, new type power system platform shall be established.

## **2. Cost and Sales Volume of New Energy Vehicle**

### **(1) Cost Analysis**

**For commercial vehicle,** we shall use public bus as a sample case to analyze the cost of new energy commercial vehicle. The cost of a new energy bus is much higher than that of an ordinary bus. It is estimated that the price of a pure electric bus will be around 2 million RMB, and the price of a hybrid- powered bus will be above 1 million RMB. Although the cost of purchasing is relatively high, the operating cost of a new energy bus is significantly lower than that of a conventional bus.

**For passenger vehicle,** the cost analysis shall be conducted under two circumstances: if a buyer purchases a car and cell at the same time, the cost will be much higher than that of a conventional car; if a buyer purchases a car alone, and uses a leased fuel cell to drive the car, the cost will be close to that of a conventional car.

### **(2) Sales Volume Analysis.**

**For commercial vehicle,** the demonstration project of “Ten Cities and A Thousand Vehicles” was launched in 2009. In 2010, more than 20,000 domestically produced new

energy vehicles were used in the area of public transportation, which stimulated market demand of more than 150,000 vehicles.

**For passenger vehicle,** new energy passenger vehicle has not formally entered the market. It is estimated by many experts that in 2020, the market share of pure electric vehicle in the overall auto market will reach 3% - 5%. A very optimistic estimation is 6%.

### **(3) Pilot Sales**

In the field of commercial vehicle, pilot projects for new energy vehicle will be focused on public transportation. In specialized industries, the project group holds that pilot projects will be conducted through governmental purchase in vehicle using units which have special needs, such as garden and park, afforestation, sanitation, sports and entertainment, etc. In the field of taxi, given the fact that in our country taxi services are mainly operated through taxi corporations, it is quite likely that new energy passenger vehicle pilot projects will be initially conducted in taxi corporations by the means of “corporate purchasing designated by government”. In May 2010, the first 30 pure electric taxies were formally put into operation in Shenzhen. Adding the 10 taxies which have been tested and operated early this month, there are 40 zero-emission taxies running on road. The objective of Shenzhen is to realize large-scale operation of pure electric taxies, or even to replace the fuel powered taxies in operation. On December 24, 2010, Beijing’s first electric taxi charging station was set up in Yanqing, which will provide service for the 50 electric taxies manufactured by the FOTON Motor Group.

## **IV. The Future Development Trend of Automobile Industry**

### **1. Scenario Analysis**

The project group has chosen three key factors - vehicle utilization cost, level of economic growth and cell technological innovation to perform scenario analysis for the development of automobile industry in the next 10 years. The economic growth objective

is related to scale, which means the “market expansion” for automobile industry. The technological innovation indicator is connected with deepening, which means the “market deepening” of automobile industry. The product oil price index is related to vehicle utilization cost, which reflects the direct utilization cost of a vehicle.

**Table 2 Scenario Settings**

<b>Driving Factor</b>	<b>Parameter</b>	<b>Conservative Scenario</b>	<b>Basic Scenario</b>	<b>Radical Scenario</b>	<b>Reason of Settings</b>
<b>Vehicle Utilization Cost</b>	Product Oil Price (\$/barrel)	80	150	300	The rise and fall of vehicle utilization cost is directly related to people's consumption orientation.
<b>Economic Growth</b>	GDP Growth Rate (%)	6%	8%	10%	Economic growth is directly related to the development direction of auto industry.
<b>Technological Innovation</b>	Charging Time	2 hours	1-2 hours	20-30 Minutes	Cell technology is the key bottleneck restricting the development of electric vehicles.

The key of the game between new energy vehicles and conventional vehicles lies in the oil price, whose continuous rising trend is conducive to the rapid expansion of the market for new energy vehicles. The improvement of economic growth level will help to boost investments on and strengthen support to new energy vehicles. If in the next 10 years the cell technology achieves breakthrough by which the electric vehicle will overcome the problem of long charging time, the competitiveness of electric vehicle will be greatly enhanced, and can challenge fuel powered vehicle relying on its absolute advantage in electricity price.

## **2. Five Highlights in Future Automobile Industry**

Based on the scenario analysis, the project group predicts that in the future automobile industry there will be five highlights centering around new energy vehicles:

**(1)The substitution effect of new energy vehicles against conventional vehicles will be significantly increased.** With the rise of product oil price, economic growth and progress in cell technology, new energy vehicles will have more significant advantages in operating cost and funding support. The technological constraints, such as charging time, etc., will be reduced, and the substitution effect of new energy vehicles against conventional fuel powered vehicles will be gradually strengthened.

**(2)New energy vehicles will spread rapidly in second-tier , third-tier cities and rural areas.** In the future new energy vehicle will certainly enter the market, and relying on its cost advantage, expand market into second-tier and third-tier cities, as well as rural areas. It will become a more economic means of transportation.

**(3)The demand of mid-low income class for new energy vehicle will be continuously increased.** A sharp rise of oil price will dramatically increase the living expenses of mid-low income class. If the government adequately subsidizes the purchase of new energy vehicle, plus the prominent advantage of new energy vehicle in the electricity price, more and more people from the mid-low income class will choose to purchase new energy vehicles.

**(4)The vehicle cell's charging time will be greatly shortened, and the competitiveness of new energy vehicle will be strengthened.** Technological innovation is the only way to solve the problem of long charging time for electric vehicle. The breakthrough in cell technology will greatly shorten the charging time of electric vehicle. The consumption demand for electric vehicle will be significantly increased, the profitability and initiative of charging station operators will be greatly improved, and the competitiveness of new energy vehicle will be remarkably strengthened.

**(5)The network construction of charging stations will be constantly improved and perfected.** In order to make battery charging as convenient as fuel charging, the network construction of charging stations must be enforced. Driven by our country's

supportive policy, various enterprises such as the State Grid Corporation of China and the CNPC etc. have announced their planning for charging stations, and vigorously devoted themselves to the construction of charging stations. The overall electric vehicle industrial chain, with the support of national policies, will quickly solve its problem in funding, technology and marketing, etc. Relevant regulations on the network layout of charging stations will be gradually improved and perfected.

Driven by market mechanisms and government policies, the automobile industry in China will usher in a “Low-Carbon Era”. Although the market demand for new energy vehicle remains unclear, the national supportive policies and relevant laws, regulations and standards still need to be improved, the key technologies such as power cell technology urgently require for thorough research & development, the new energy vehicles will finally achieve perfection through trials and errors, constantly expand the market, and lead on low carbon economy!

# 中国低碳汽车：政策前沿与前景预测

摘要报告

2011年1月

中国经济体制改革研究会公共政策研究中心

长策智库

[www.changce.org](http://www.changce.org)

汽车产业发展对我国经济增长和社会发展具有巨大的影响。从20世纪中期，我国汽车产业开始起步，目前已经成为国民经济的重要支柱产业之一，汽车市场也成为世界最大的汽车消费市场，各国汽车巨头均在这里争奇斗艳，“汽车时代”正逐步到来。

## 一、汽车的经济效应

汽车对国民经济和社会发展的作用体现在直接和间接两个层次。直接经济效应表达为对GDP、就业和税收等方面的贡献；间接经济效应表达为其所能带动的其他产业的关联效应。

### 1. 直接经济效应

**(1)对GDP的贡献。**作为国民经济的支柱产业，汽车产业对我国经济发展的贡献率日益提高。从统计结果来看，1991~2008年我国汽车产业增加值的经济贡献率呈现以下特征：i. 我国汽车产业的增长明显高于整个工业和GDP的增长。汽车增加值占GDP比重呈逐年递增趋势（从1991年的0.78%增加至2008年的1.36%，年均增长率为6.06%），说明汽车产业规模的逐步扩大以及在国民经济中的影响力逐渐提高；ii. 2001~2007年我国汽车产业增长弹性系数为0.28，表明汽车产业增加值平均每增加一个单位促使国民经济增长0.28个单位，汽车产

业增长对国民经济增长带动效果显著。课题组认为，“十一五”期间，我国汽车产业增长已经达到了一个高峰。下一个五年发展周期中，汽车对国民经济增长的直接贡献将趋于稳定，增长速度约在年均20%-30%之间，增加值约占GDP约1.5%左右。

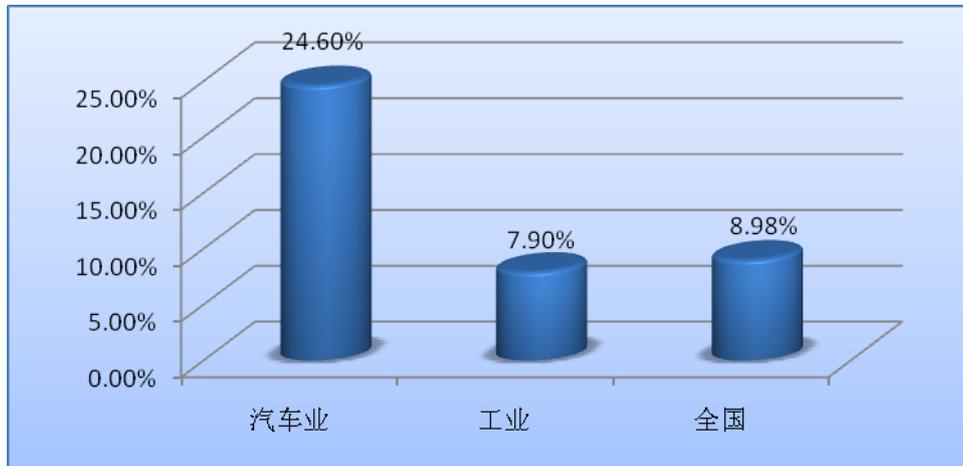


图 1. 2009 年汽车业、工业及全国 GDP 增长率比较

(2)对社会就业的贡献。我国汽车产业具有就业容量大的特点。1991~2008年我国汽车产业年末职工人数从170万人增长到207万人，占第二产业从业人员总数约1%，占制造业从业人员约2%，并有逐步上升的趋势。2001~2008年我国汽车产业就业弹性系数为0.374。课题组认为未来五年的发展周期中，汽车业本身对社会就业的贡献仍然将保持在250-300万人左右，趋于稳定。

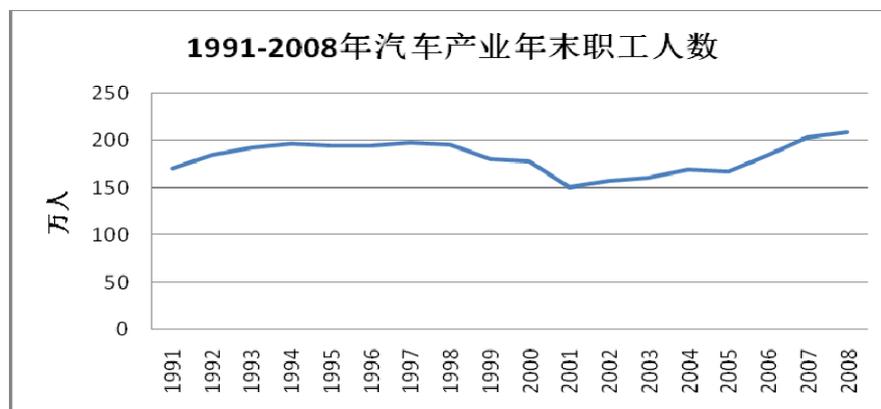


图 2.1991-2008 年汽车产业年末职工人数

**(3)对税收的贡献。**我国汽车产业对税收贡献在机械行业中占有重要位置。从1991年起，汽车产业的利税总额占全国机械行业基本上维持在20%以上（除极个别年份），税金增加率除2008年较低之外，其他均增长达到两位数。未来五年周期中，汽车产业利税总额占全国机械行业利税总额仍维持在20%左右。

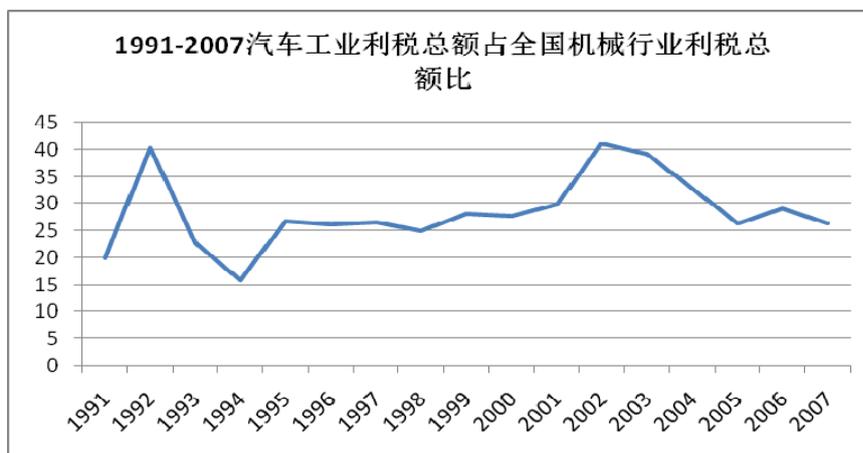


图 3. 1991-2007 年汽车工业利税总额占全国机械行业利税总额比

## 2.间接经济效应

汽车产业涉及上下游产业链较长，与大约 100 多个相关产业直接或者间接、前向和后向相关。汽车产业的前向关联产业主要包括原材料工业、设备制造业、能源工业、机械电子纺织业等配套产品方面；据测算，中国汽车工业对主要上游产业所产生的完全需求大概要占汽车工业总产值的 92%~94%，而完全需求所带来的增加值与汽车工业增加值之比高达 2.26。未来五年这一作用的波及系数将保持稳定。

表 1. 汽车产业波及效果系数

产业部门	波及系数	产业部门	波及系数
金属冶炼及压延加工业	0.279	电力及蒸汽生产供应业	0.0597
化学工业	0.178	电子及通讯设备制造业	0.0273
机械工业	0.089	货物运输及仓储业	0.0643
金属制品业	0.070	非金属矿物制品业	0.0659

汽车产业的后向关联主要包括销售业、服务业、交通运输业、公路、建筑业。这种间接的影响作用随着汽车产业的不断发展呈现出逐步扩大的趋势。1978年-2008年汽车产业对服务业增长的贡献率为36.9%，拉动服务业增长9.3%，2001-2008年，汽车产业的GDP、工业和服务的产出弹性分别为0.708、0.683和0.574，体现出汽车产业日益放大的间接影响效应。就目前来看，汽车产业发展对服务业的推动还未充分表现出来，包括汽车金融、保险、广告、租赁、司机培训、维修、汽车救援、汽车美容、加油站、停车场、汽车旅游等一系列与汽车产业相关的服务业目前在城市经济中的位置和发展状况还趋向于起步阶段，未来伴随着城市经济以及城市群落的发展，这一领域将是未来汽车产业对服务业的拉动集中领域。

## 二、汽车产业的政策影响

汽车产业的政策主要包括了涉及汽车的产业、能源、环境和交通等方面的政策总和。

### 1. 汽车的产业政策

整体上看，我国汽车产业政策仍处于不断“转型”过程之中，从20世纪80年代起，我国汽车产业政策的经历了从“政府主导”向“政府导向”、从“行政干预”向“行政+市场”、从“注重生产”向“生产和消费并重”的不断转型。目前我国汽车产业政策涉及到包括制造业、商务、能源、环境、城市交通等诸多领域，政策内容涉及包括了市场竞争、自主开发和创新、金融服务、消费、税收和进出口等各个方面。围绕着汽车的生产、消费和使用等各环节，汽车的政策已经初步形成了一个系统指导、管理和协作的体系框架。

但产业政策仍面临着许多问题和挑战，如重生产、轻消费；重结构、轻市场；重建设，轻经营；重结果；轻机制等，以市场换技术，过多求大，求规模等，使得产业政策的有效性受到抑制。

未来我国的汽车产业政策将会进一步转型，即逐步从面向产业结构向产业组织转变，即从单纯地重视生产和结构进步向重视市场竞争和秩序等方向转变；从

单纯地重视生产规模向更加重视关键技术和新技术领域转变；从单纯地依靠政府行政的力量到以政府为主导的社会共治机制转变；从单纯地产业政策向产业、消费、环境、能源和交通等综合性系统化政策转变；从单纯的政策指导到综合性的激励手段和工具，从单纯地生产领域向消费和使用领域扩展。

## 2.能源政策

我国未来能源发展“十二五”规划将进一步搞好石油能源节约和替代工作。以洁净煤、石油焦、天然气替代燃料油（轻油），实施机动车燃油经济性标准及相关配套政策；实施清洁汽车行动计划，发展混合动力汽车，在城市公交车、出租车等行业推广燃气、电动汽车。课题组认为能源的生产与消费总量与国民经济增长具有密切关系，随着未来“十二五”规划国民经济增长速度减缓，能源的生产和消费总量也将有一个平稳期。对汽车产业的影响主要表现在能源价格和资源税、碳税政策上。

**(1)能源价格的影响。**从未来的趋势来看，我国目前的油价定价和管理体制将不会发生较大的变动，在我国能源市场70%依赖进口之后，目前国内能源市场的价格基本上决定于国际市场，国内可供调节的空间有限。在政府掌握油价决定的时间、价格变动幅度等主要因素后，有可能将一些定价空间交由企业来灵活掌握。从我国油价变动趋势来看，目前我国燃油价格虽然已经处于历史高位，且价格变动只涨不跌。预计未来我国油价将继续显著高于市场竞争性价格，这个趋势短期内不会发生变化。燃油价格将影响汽车的消费和使用，进一步提高目前燃料车的用车成本。电价是新能源概念汽车的重要成本要素，未来电力价格中短期内存在一定的上涨势头，但幅度不会很大。由此可见，传统的燃料汽车使用成本将进一步提高，新能源汽车凭借电价优势发展前景广阔。

**(2)资源税和碳税政策的影响。**2010年6月，资源税改革率先在新疆启动，将原油、天然气资源税由从量计征改为从价计征。资源税改革已经纳入到“十二五”规划的议程。但资源税改革并不能“一蹴而就”，资源税对资源价格的影响主要取决于供给和需求弹性。由于目前征税地区和非征税地区对资源生产企业影响不同，试点仍然非常有限。课题组认为未来在全国范围内统一实行资源税是有

效实施资源税改革的重要条件，资源税计征之后，汽车产业的生产成本上升，会促使汽车产业的生产企业进一步资源整合。碳税是未来“十二五”规划重要内容之一，目前仍然在研究之中，是否开征尚无定论。总体来看，碳税有可能包含在环境税、消费税或资源税三者之中，无论归入哪一税种，都将对能源消费产生重要影响。课题组认为在其他条件不变的情况下，开征碳税，将抑制能源的消费，促使生产和消费寻求替代品。从政府税收的总盘子来看，目前政府的财政收入占国内生产总值约 20%，宏观税负则达到了 30%左右（此观点有争论），盲目开征新税种，并不利于国内经济和社会的可持续发展。未来可能的选择是开征新税种，如碳税；同时降低其他税种，如消费税，个人（公司）所得税等，由此也会达到一种平衡。也有可能采取调整增值税结构的方法，调高能源密集型产品的税率，降低非能源密集型产品的税率。因此，在这种条件下，课题组认为碳税的开征对生产企业会有影响，一定程度上提高了生产成本，对消费和使用的影响有限。

**(3)车船税改革。**2011 年 2 月 25 日，新车船税法通过，该法规定乘用车将按排气量征税，同时还规定节能、新能源等车船可以减征或者免征车船税。车船税征收上的优惠为新能源汽车在起步阶段提供了较为宽松的市场环境，间接鼓励新能源汽车的发展。

总体来看，能源政策趋紧是未来“十二五”规划的趋势。这一信号将会使得未来能源、资源品的价格维持在一个较高的水平上。在现有的技术条件下，燃料汽车的生产 and 消费将在未来时期面临着“高成本”的时代。

### 3.环境政策

在针对与汽车产业相关的政策方面，最新出台的《国家环境保护十二五规划（征求意见稿）》中提出要进一步完善移动源大气污染物排放标准体系，对机动车尾气排放标准、技术法规、管理监督等方面都提高了要求。课题组认为未来的环境政策对汽车产业的影响主要在于机动车尾气排放、提高燃油利用效率、鼓励新能源动力汽车的开发和使用等方面。后两者具有辅助性的意义，前者是关键性的影响因素。控制机动车尾气排放标准、规范机动车年检、加强机动车尾气检测水平等在一定程度上都会增加汽车产业的进入成本，提高汽车产业的进入门槛。

课题组认为未来随着环境政策越来越倾向于严厉，尾气排放的标准将会逐步提高，将对我国汽车产业将会带来一定的影响。（1）尾气标准有助于形成新的“绿色壁垒”，提高进入门槛和产业的技术要求，增加汽车产业新进入者和在位企业的技术开发成本；（2）通过标准提高有助于优化汽车产业的市场结构，优胜劣汰。

#### 4.交通政策

未来中国的交通政策仍将着重解决基本交通出行需求问题，如何形成城市内部、城乡之间、城市之间和区域之间便捷、高效、物流成本较低的交通通行网络，是摆在“十二五”后期的重要问题。交通政策对汽车产业的影响主要体现在汽车消费和使用环节。它主要体现在城市内部、城区和区域之间的交通设施是否完善和通畅、出行成本、其他交通工具的替代性等等诸多客观和主观因素。

**(1)收费公路制度。**现行收费公路制度面临的最大问题是将公共利益当作小团体利益。最初收费公路制度为促进公路建设的重要融资手段，但之后就被地方政府演绎成为谋求高额利润的重要途径。公路违规收费现象阻碍了汽车行业发展，不利于汽车产业链的延伸。

在现有制度格局不变的条件下，收费制度将一直会延续下去。它将进一步提高汽车使用成本，抑制汽车产业对服务业的进一步拉动作用。课题组认为未来破除收费公路制度，降低我国物流、出行成本是必然的趋势，但由于制度壁垒较高，很难在短时期得到解决，因此，创新收费工具，规范收费标准，逐步减少收费站数量，减少因收费带来的时间损失，将是未来五年可行的方案。

**(2)机动车数量控制和限行政策。**目前机动车数量控制和限行政策是北京、上海等几个超级城市为了缓解交通拥堵的无奈之举，政府面临着机动车的两难选择，即通过机动车的消费增加更多的经济收入，但过多的机动车使用会直接引起交通拥堵问题。限行等政策并不能提高抑制汽车市场的消费来从根本上缓解城市的交通拥堵，相反，限行有可能引发汽车用户产生过度消费的问题。已有大量的观点直接指出尾号限行间接地促进了汽车的消费。汽车限购和限行政策在一定程

度上不利于汽车产业的发展,也不一定能够解决交通拥堵问题。轨道交通网络化、便捷化和快速化为正常(早晚高峰)的城市人口流动提供了优质的交通工具。尽管目前我国在轨道交通运营和接驳等方面还存在很多问题和矛盾,但课题组认为未来以轨道交通为主导的城市公共交通系统的建设将是解决我国大城市交通拥堵的主要方式。未来超级城市内用车成本还将会逐步提高,如拥堵税开征、提高停车费等,这在一定程度限制汽车在城市内短途使用,课题组认为与城市限购、限行等政策相比,这些影响会导致城市居民根据不同的出行目的进行更有效的交通工具选择,在一定程度上提高汽车的使用效率。

### 三、新能源汽车的成本和收益分析

新能源汽车是汽车行业发展的必然趋势。目前,汽车行业“十二五”规划草案的初稿也已制定完毕,总体目标仍是强调我国汽车工业发展要从汽车大国向汽车强国转变。规划确立了涉及电动汽车、混合动力汽车和燃料电池汽车的发展路线和目标,“十二五”期间将是以汽车电控化和动力混合化两大技术相结合为标志的产品换代与产业升级期。

#### 1. 新能源汽车的发展趋势

(1) **电动汽车**。电动汽车科技发展“十二五”专项规划(简称《规划》)的草案把电动汽车发展战略从企业战略和行业战略层面上升到国家战略的高度,在坚持节能与新能源汽车“过渡与转型”并行互动、共同发展的总体原则指导下,进一步确立“汽车动力电气化”技术转型战略,重点发展电气化程度高的电动汽车,政府直接介入,培育新兴产业,力争实现与国际先进水平基本同步的目标(到2015年左右,电动汽车保有量达到百万辆级)。

(2) **混合动力汽车**。《规划》致力于推进各种混合动力汽车的产业化技术研发与大规模产业化。针对混合动力汽车大规模市场需求,开展系列化混合动力产品的产业化研发,将节能、环保发动机开发与电动化技术有机结合,重点突破产品性价比,形成市场竞争力。

**(3)燃料电池汽车。**“十二五”期间，我国将重点攻克以先进燃料电池/新型动力电池、下一代电机驱动、复杂机电耦合等为代表的一批前沿高端难点技术。针对燃料电池汽车发展需求，建立新型动力系统平台。

## **2.新能源汽车的成本与销量**

### **(1)成本分析**

在商用车方面，以公共汽车为代表分析新能源商用车成本。新能源公交车的成本比普通公交车高出许多，其中纯电动车每辆的价格预计在200万左右，混合动力车每辆的价格预计在100万以上。虽然购买成本较高，但新能源汽车的运营成本却明显低于传统车辆。

在乘用车方面，乘用车成本分两种情况考虑：若购车同时购买电池，则成本大大高于传统汽车；若购买裸车，采用电池租赁形式驾驶，则汽车成本与传统汽车相近。

### **(2)销量分析**

在商用车方面，2009年中国“十城千辆”示范工程启动，2010年在公交领域推广应用2万辆以上国产新能源汽车，带动市场应用15万辆以上。

在乘用车销量方面，新能源乘用车方面还没有正式走入市场，众多专家预测到2020年，纯电动汽车将占到整个汽车市场份额的3%—5%，非常乐观的预测是能占到6%。

### **(3)销售试点**

未来在商用车领域，新能源汽车主要试点以公共交通为主；在特种行业，课题组认为包括园林、绿化、卫生、体育休闲娱乐具有特殊需求的用车单位等将会在政府采购的条件下首先实现试点；在出租车领域，由于我国出租车公司以公司制为主，新能源汽车也完全有可能通过政府指定、公司采购的方式成为第一批乘用车试点单位。2010年5月，深圳首批30辆纯电动出租车率先正式投入运营，

加上本月初已先行测试运营的 10 辆,如今深圳已有 40 辆零排放出租车在公路上。深圳的目标是实现纯电动出租车的规模运营,甚至置换目前运营的燃油出租车。2010 年 12 月,北京首座电动出租车充电站 12 月 24 日在延庆落成,为北汽福田制造的 50 辆电动出租车服务。

#### 四、未来汽车产业的发展趋势

##### 1.情景分析

课题组选择汽车用车成本、经济增长水平和电池技术革新三个关键因素对未来 10 年汽车行业发展进行情景分析。与规模联系的是经济增长指标,它意味着汽车产业的“市场广化”;与深化联系的是技术革新指标,它意味着汽车产业的“市场深化”;与用车费用联系的是成品油价格指标,它表达的是用车直接费用。

表 2 情景设定

驱动因素	参数	保守情景	基本情景	激进情景	设置理由
用车成本	成品油价格 (美元/桶)	80	150	300	汽车成本涨跌直接关系到人们的消费取向。
经济增长	GDP 增长率 (%)	6%	8%	10%	经济发展直接关系到汽车行业的发展方向。
技术革新	充电时间	2 小时	1-2 小时	20-30 分钟	电池技术是制约电动汽车发展的关键瓶颈。

新能源汽车与传统汽车博弈的关键在油价,油价的持续攀升趋势有利于新能源汽车市场的迅速推广;经济增长水平的提高,有利于对新能源汽车的投资和扶持力度的增加;若未来 10 年电池技术有了突破性进展,电动汽车摆脱了充电时间的困扰,竞争力将大大增强,可依靠电价的绝对优势挑战燃油汽车。

##### 2. 未来汽车行业五大亮点

基于情景分析,课题组预测未来汽车行业将出现以新能源汽车为中心的五大亮点:

**(1)新能源汽车对传统汽车的替代性显著提高。**随着未来成品油价格的升高、经济增长及电池技术的进步,新能源汽车在运行成本和资金支持上的优势更加显著,并减弱充电时间等技术上的制约,新能源汽车对传统燃油汽车替代性逐渐增强。

**(2)新能源汽车在二、三线城市及农村快速推广。**未来新能源汽车必将走入市场,依靠其成本优势,拓展方向转为二级、三级城市以及农村,成为更经济的代步工具。

**(3)中低收入阶层对新能源汽车的需求不断增加。**油价的大幅增长会明显增加中低收入阶层的生活负担,若政府对购买新能源汽车给予充分的补贴,加上新能源汽车在电价上的突出优势,更多的中低收入阶层会选择购买新能源汽车。

**(4)汽车电池充电时间大大缩短,新能源汽车竞争力增强。**技术革新是解决目前电动汽车充电时间过长的唯一途径,电池技术的突破将大大缩短汽车充电时间,电动汽车的消费需求会显著增加,充电站运营商的盈利水平和积极性也随之大大提高,新能源汽车竞争力显著增强。

**(5)充电站网络化建设日趋完善。**为了使电动汽车充电可以像加油一样方便,充电站的网络化建设势在必行。在国家扶持政策的推动下,国家电网、中石油等众多企业相继公布了充电站规划并积极投入建设。整个电动汽车产业链在国家政策的支持下,无论从资金、技术还是市场推广等方面都将得到快速解决,针对充电站网络布局的相关规定也将逐步完善。

在市场机制和政府政策的共同推动下,中国将迎来汽车行业的“低碳时代”。尽管针对新能源汽车的市场需求尚不明朗,国家的扶持政策和相关法规标准还有待完善,动力电池等核心技术亟需深入研发,但新能源汽车终将在摸索中日趋完善,不断开拓市场,引领低碳经济!