

# Study on the Time-sharing Lease Mode of New-energy Cars in China

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**Abstract.** Along with the ever-increasing *R&D* of new-energy cars, the embedding of autonomous vehicle operation system, and the application of *Big Data* and time-sharing technology, the time-sharing lease mode of new-energy cars rises in China. This new model is helpful to promote the efficient car utilization and environmental protection. Through the analysis of objective conditions, industry chain and service platform operating system of new-energy car time-sharing lease mode in China, this paper reveals the popularization value of this new mode and the promising future in China.

## Introduction

Nowadays, car is a pervasive and common traffic tool for urban residents in many developing countries. Particularly, China has entered into the recognized auto society since 2012. The explosive growth of car ownership has led to a series of environmental problems. On one hand, a large number of cars in use cause air pollution and traffic jams, which seriously increase urban environmental load. On the other hand, the use frequency of each private car is usually very low. Cars take up a lot of parking space resources during a relative long lay-up period. To solve the pollution caused by power supply, car manufacturing companies involve in the *R&D* and promotion of new-energy vehicles. This is a good way to reduce cars' emissions pollution in use phase. However, it can't break through the dilemma in above two aspects fundamentally. From a long-term perspective, the car usage pattern (or the public's travel pattern) should be transformed from car-occupying to car-sharing.

In the broad sense, the car-sharing pattern includes *taxi-service*, *ride-sharing* and *car-leasing*. According to car owners' different attributes, *car-leasing* can be further subdivided into *traditional car-leasing* and *private car-sharing*. These three models have both similarities and differences, and show different operation processes in different times. At present, with the development of the "Internet +", the above three patterns change greatly in China. *Taxi-service* and *ride-sharing* are integrated into the Internet platform, emerging *Didi*, *Uber*, etc. In support of internet car-sharing platform, car-leasing also appears a new operation pattern—*time-sharing lease*. This kind of lease has become another popular business model after the emergence of modern ride-sharing via the Internet platform. In the context of shared economy, leasing companies share service network and integrate resources at a rapid speed. Especially in the field of new-energy cars, *time-sharing lease* will become a core business model of electric cars over the next five years. This paper aims to explore the following three questions about *the time-sharing lease mode of new-energy cars*: (1) why does this new mode rise in China? (2) how does this new mode operate in China?(3) what are the advantages and popularization value of this new mode?

## The objective conditions of new-energy car time-sharing lease

**The ever-increasing R&D and marketing of new-energy cars.** *New-energy cars* refer to the cars with new structure by adopting unconventional vehicle fuel as power source (or conventional vehicle fuel with a new on-board power plant) and integrating advanced power control and drive technologies. According to different power sources, *new-energy cars* can be divided into *Fuel Cell Vehicles (FCV)*, *Battery Electric Vehicle (BEV)*, *Hybrid Vehicle (HV)*, *Extended-Range Electric Vehicles (EREV)*, *Hydrogen Engine Vehicles (HEV)* and other new-energy vehicles.

Nowadays, *BMW, Ford, GM, Nissan, Geely, BYD* and some other automobile manufacturing enterprises in different countries devote themselves to the *R&D* of new-energy cars. *Nissan Leaf, Tesla Model S, BYD Tang, Mitsubishi Outlander PHEV* and other world famous types of new-energy cars spring up. Compared with traditional types, all of these cars have better performance in energy saving, environmental protection and driving safety. In addition, equipped with advanced navigation and autonomous driving control system, new-energy cars are generally easy to operate and have good popularity. By analyzing the sales data of global top 20 new-energy car manufacturing enterprises and new-energy car models from January to June in 2016<sup>[1]</sup> (Fig. 1), we found that China has notable advantage in *R&D* and marketing of new-energy cars. Specifically, the number of Chinese enterprises (car models) takes up 50% (50%) and their total sales quantity accounts for nearly 41% (43%).

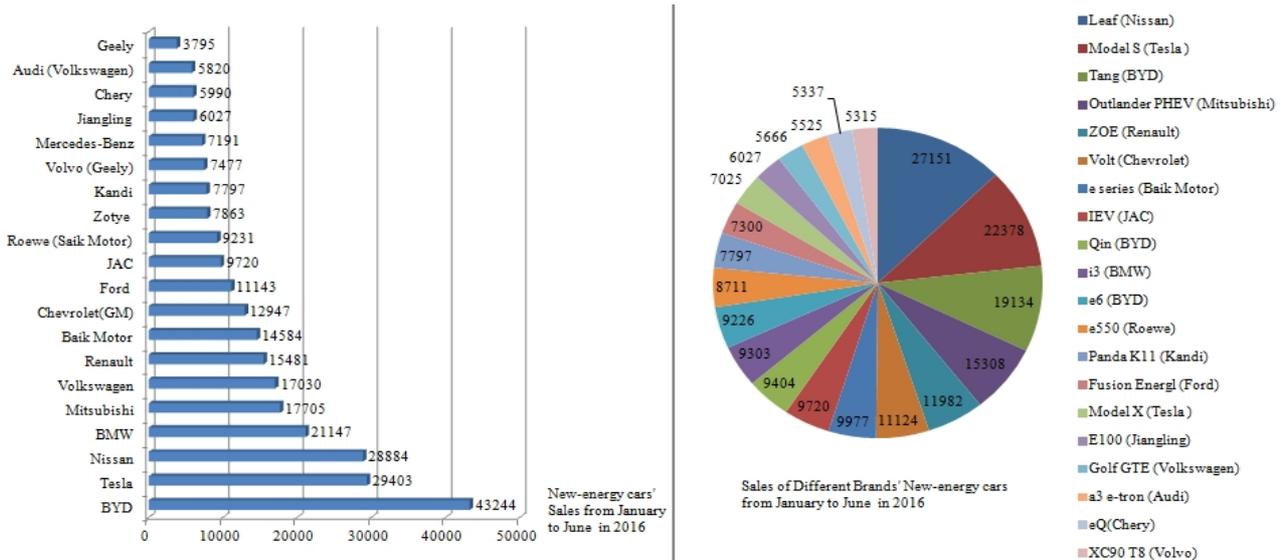


Fig. 1. New-energy car sales data of global top 20 from January to June in 2016

**The stimulation of national policies for new-energy cars.** China's new-energy automotive industry has entered a rapid development stage. From March 2015 to June 2016, relative legislations enacted by the Chinese government add up to 25 items, involving production regulation, marketing promotion, charging infrastructure construction, financial subsidies, scrap car processing and other relative aspects. In particular, the Chinese government has launched a lot of new policies: (1) *Unlimited Purchase and Travel Policy*; (2) *Mandatory Procurement Policy* for the Government Agencies and Public Institutions; (3) *Finance Subsidies Policy* [The subsidy standards of 2016 show as follows: *BEV* ( $100km \leq R < 150km$ ), 3710.2998\$ per year; *BEV* ( $150km \leq R < 250km$ ), 6678.5396\$ per year; *BEV* ( $R \geq 250km$ ), 8162.6595\$ per year; *HV/EREV* ( $R \geq 50km$ ), 4452.3598\$ per year. From 2016 to 2020, the subsidies decrease 20% every two years]; (4) *Charging Infrastructure Construction and Operation Reward Policy*; (5) *Car Models Audit Policy* [1022 kinds of new-energy car models are selected into official directory in 2016]; (6) *Used Power Battery Recycling Policy*.

**The penetration of mobile internet and shared-economy concept.** With the rise of "Internet +", people travel much more conveniently. On one hand, the "Smartphone+ Driving" operation platform emerges, such as *idriver* of *BMW*, *sync* of *Ford* and *touchlife* of *Toyota*. Cars have become *Autonomous Vehicles (SAVs)*. On the other hand, the "Mobile Internet + Going Out" mode becomes mature gradually as the wide spread of car-service software, including *Didi*, *Yidao*, *Shenzhou* and *Tiantian*. In this new mode of car service, a shared economic consumption concept has been formed, which changes the traditional consumption pattern of consumers. According to the database of *Chinese Commerce Industry Research Institute*, the amount of mobile travel users in China is 294 million in 2015, increased by 39.3% compared to the number in a year earlier, and the user scale is expected to increase to 487 million in 2016-2018<sup>[2]</sup>.

### The operation system of Chinese new-energy car time-sharing lease

Nowadays, a new-energy car lease industry chain, which concludes auto parts producers, battery producers, motor producers, electric pile manufacturers, car manufacturers, time-sharing technology providers and other strategic alliance members, has been established in China, shown in Fig. 2.

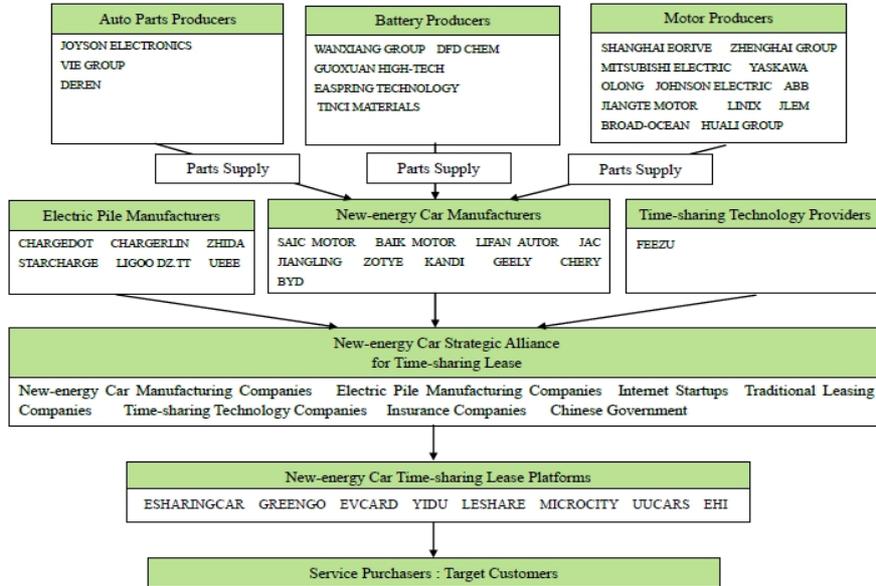
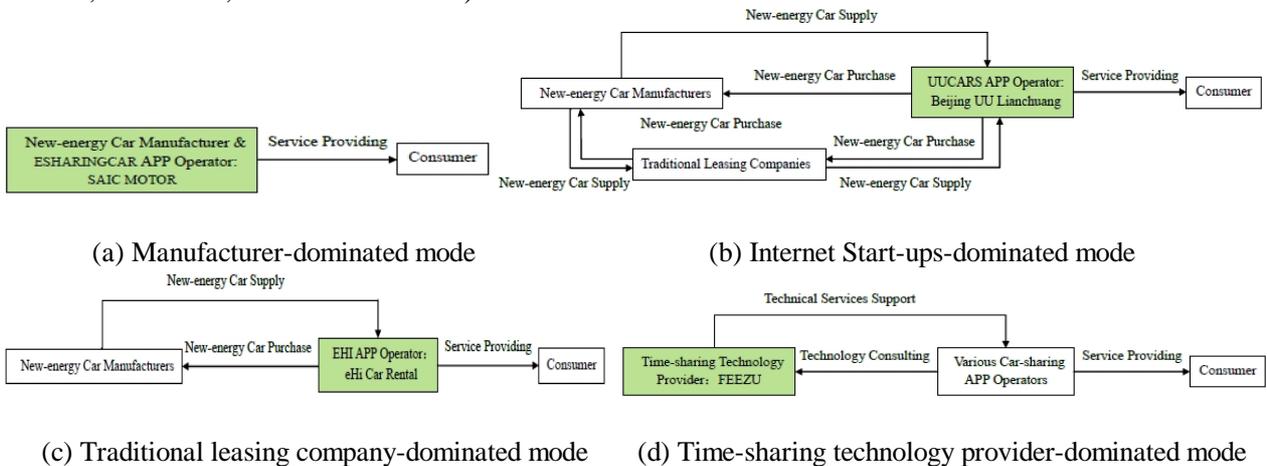


Fig. 2. China's new-energy car lease industry chain

According to different roles of platform service providers, the operation models of the new-energy car time-sharing lease can be divided into four kinds: manufacturer-dominated mode (MDM), internet start-ups-dominated mode (ISDM), traditional leasing company-dominated mode (TLDM) and time-sharing technology provider-dominated mode (TPDM), shown in Fig. 3. Relying on the O2O service mode for the clients of mobile phones, a general service process of the new-energy car time-sharing lease comprises of four steps and achieves complete self-service, shown in Fig. 4. Therefore, the following four kinds of users' demands are satisfied: (1) government officers; (2) office workers; (3) users who are in badly need of cars; (4) specific passengers (people with no car, new drivers, liberalists, environmentalists) [3].



(a) Manufacturer-dominated mode (b) Internet Start-ups-dominated mode  
(c) Traditional leasing company-dominated mode (d) Time-sharing technology provider-dominated mode  
Fig. 3. Main operation models of the new-energy car time-sharing lease

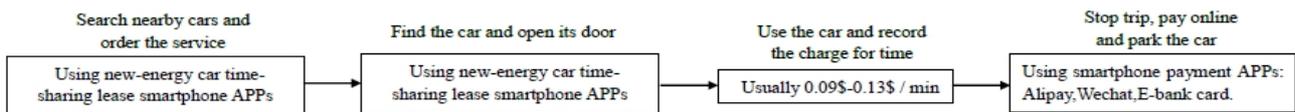


Fig. 4. General service processes of the new-energy car time-sharing lease

### The comparison of the time-sharing lease mode and other relative modes

**The ride-sharing mode vs. the time-sharing lease mode.** *Ride-sharing* is a classic mode, in which the car owner provides pick-up service in his use process. Nowadays, the pick-up service provided by part-time private car users by using *Uber*, *Didi* software platforms, is also *ride-sharing*. *Ride-sharing* has two basic features: (1) the walking routes of the owner and passenger must be overlapped totally or partly; (2) both the owner and passenger must use the car at the same time, but the passenger has no control right<sup>[4]</sup>. The emergence of the *time-sharing lease mode* separates the owner and the passenger successfully, and the passenger has control right during the paid period. In this mode, the passenger can drive to the destination after the car handover.

**The taxi-service mode vs. the time-sharing lease mode.** *Taxi-service* is a professional passenger service. Compared to the *ride-sharing*, it is more advantageous in response time and service quality. However, *taxi-service* can't separate the owner and the passenger, and the existence of "starting fare" makes it less attractive to short-distance passengers. In addition, *taxi-service* is a kind of service for others, and *time-sharing lease* is a kind of self-service, which provide much more flexibility for passengers.

**The car-leasing mode vs. the time-sharing lease mode.** In a broad sense, *car-leasing* includes *traditional car-leasing* and *private car-sharing*. In the mode of *traditional car-leasing*, passengers lease cars for third-party car leasing companies, and obtain usage and control rights at some certain time span. In this mode, users are charged by lease period. In the mode of *private car-sharing*, the owners of private cars are paid by lending their cars to others who need them, and the charge is usually fixed<sup>[5][6]</sup>. The all above lease modes achieve the separation of owners and passengers. However, the *time-sharing lease mode* is more competitive in flexibility for the time-based billing mechanism, compared to other modes. More specifically, the advantages of the *time-sharing lease mode* can be summarized as follows: (1) pay-on-demand; (2) completely self-help service; (3) returning as lend. In addition, as a part of public transportation, the *time-sharing lease mode* achieves *O2O* and *C2C* car leasing with the help of advanced time sharing technology and mobile internet platform.

### The popularization value of new-energy car time-sharing lease mode

**From the macroscopic social perspective.** According to *Navigant Consulting*, global *car-sharing* services revenue will grow to 6.2 billion dollars by 2020, with over 12 million members worldwide<sup>[7]</sup>. The main factors driving the growth of *car-sharing* are the rising levels of congestion faced by city dwellers; shifting generational mindsets about car ownership; the increasing costs of personal vehicle ownership; and a convergence of business models. *Car-sharing* contributes to sustainable transport because it is a less car intensive means of urban transport, and according to *The Economist*, *car-sharing* can reduce car ownership at an estimated rate of one rental car replacing 15 owned vehicles. However, among all kinds of *car-sharing* modes, *time-sharing lease* is the most promising commercial model, because of its three significant strengths: (1) green and environment friendly; (2) flexible and convenient; (3) economical and affordable.

**From the microscopic corporate perspective.** For the new-energy car enterprises, developing the business of *time-sharing lease* has important significance in several aspects. Firstly, different from private car market, batch purchasing of the platform under the commercial model of *time-sharing lease* helps to increase the sales volume of new-energy car promptly. Secondly, *time-sharing lease* owns some properties of public transportation. To be specific, the promotion of car brands can be facilitated as the amount of users increases. Thirdly, *time-sharing lease* can be deemed as some exploration and

innovation of distribution channels and market models. Lastly, it is possible that *time-sharing lease* will become an important distribution channel. The more rapid the renewal of used cars is, the greater development of automobile finance and second-hand car market will gain in the future.

## Conclusions

This paper roundly explores *the time-sharing lease mode of new-energy cars* in China. The new model springs up based on three objective conditions: (1) the successful manufacture of China's own brand new-energy cars; (2) the support of Chinese official policies; (3) the shift of customers' trip mode and consumption concept. The operation system of Chinese new-energy car time-sharing lease has been built up, including relatively complete industry chain, diversified service modes and intelligent service process. In addition, compared with other relative modes, advantages of implementing the new-energy car time-sharing lease mode are pointed out. Given that this paper only does the descriptive and qualitative analysis, in-depth researches on the optimal car input quantity or pricing in this new service mode are valuable and promising.

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## References

- [1] Information on <http://www.evpartner.com>
- [2] Information on <http://www.askci.com>
- [3] Krueger, Rico, Taha H. Rashidi, and John M. Rose. Preferences for shared autonomous vehicles. *Transportation research part C: emerging technologies* 69 (2016): 343-355.
- [4] Sherif, Ahmed, et al. Privacy-Preserving Ride Sharing Scheme for Autonomous Vehicles in Big Data Era. (2016):1-1.
- [5] Waserhole, Ariel, and Vincent Jost. Pricing in vehicle sharing systems: Optimization in queuing networks with product forms. *EURO Journal on Transportation and Logistics* (2013): 1-28.
- [6] Kaspi, Mor, et al. Regulating vehicle sharing systems through parking reservation policies: Analysis and performance bounds. *European Journal of Operational Research* 251.3 (2016): 969-987.
- [7] Information on <http://www.navigantresearch.com>