

Research and Development of Electric Vehicle in China and Latest Trends on Diffusion

China Automotive Technology & Research Center (CATARC)

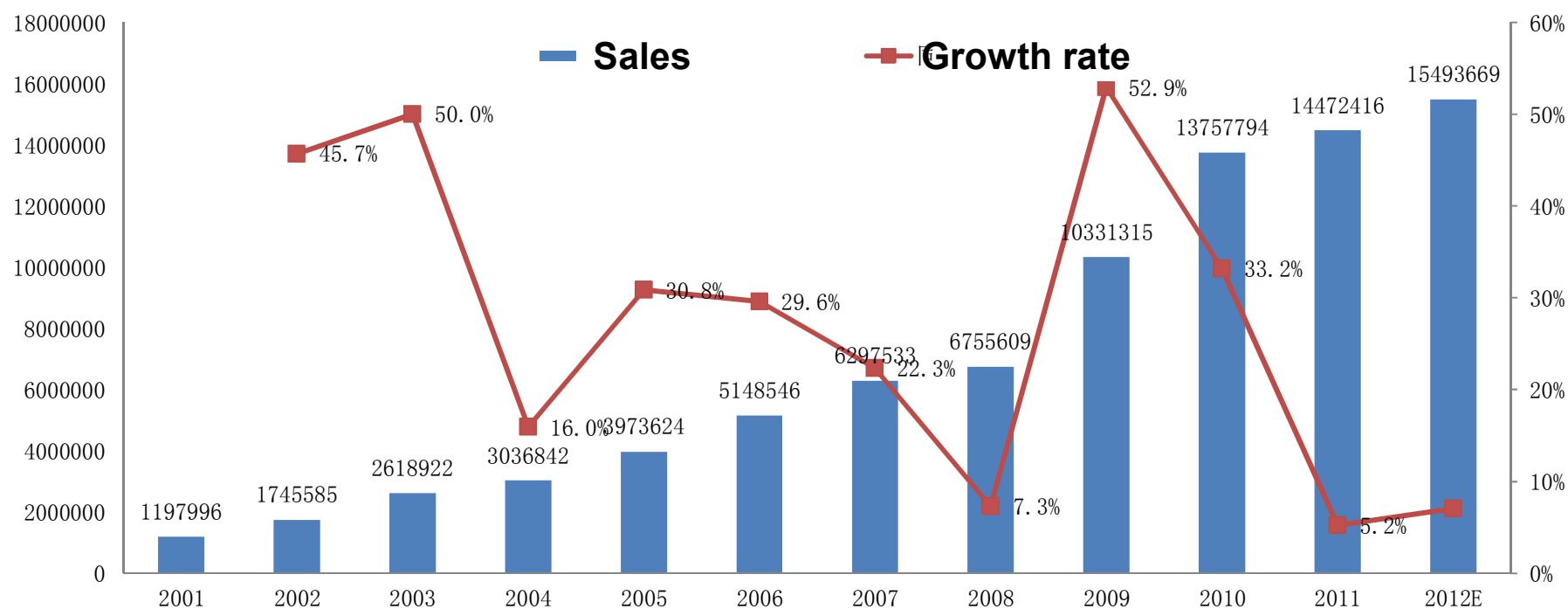
Ma JianYong

majianyong@catarc.ac.cn

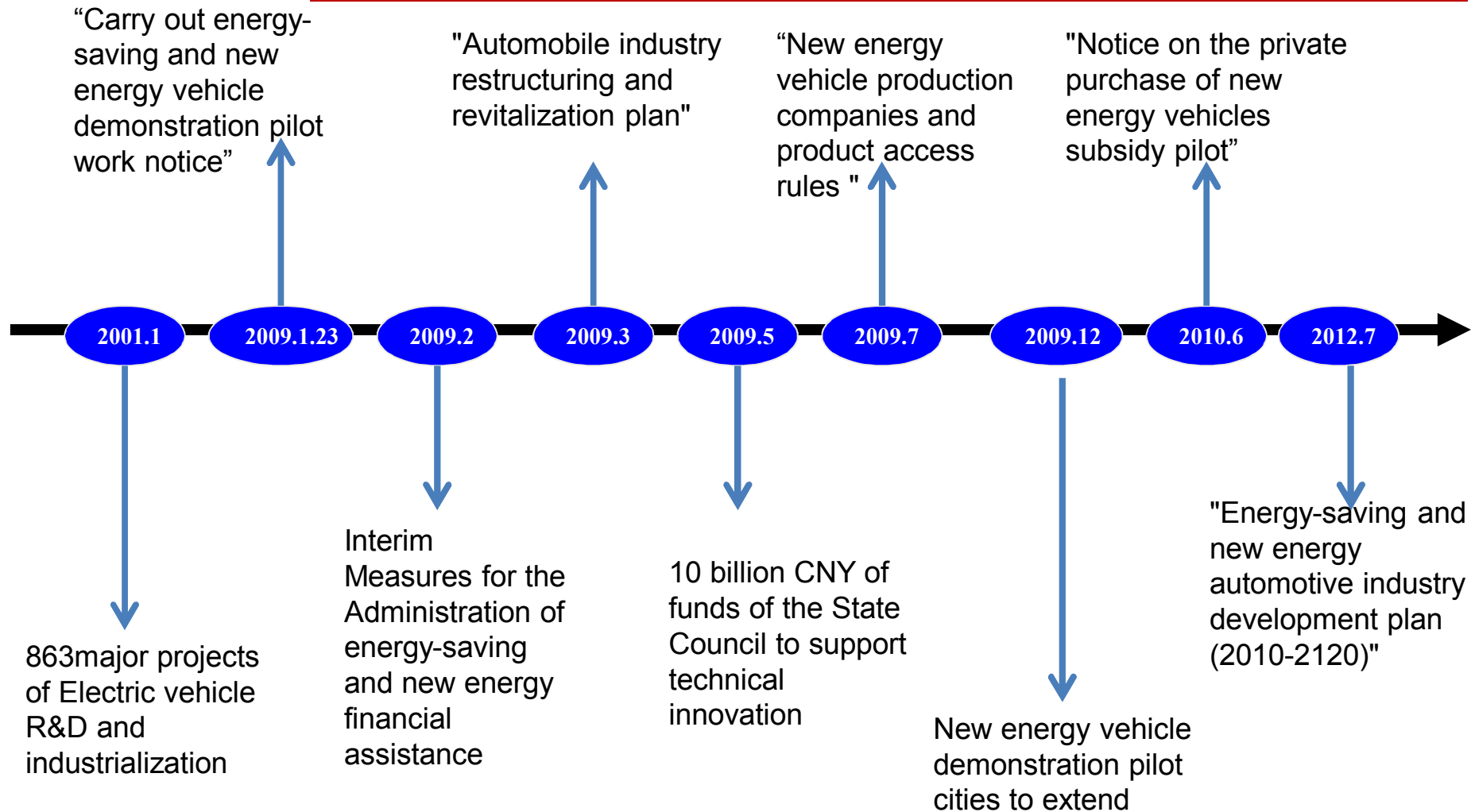
1. Research and manufacture of EV in China



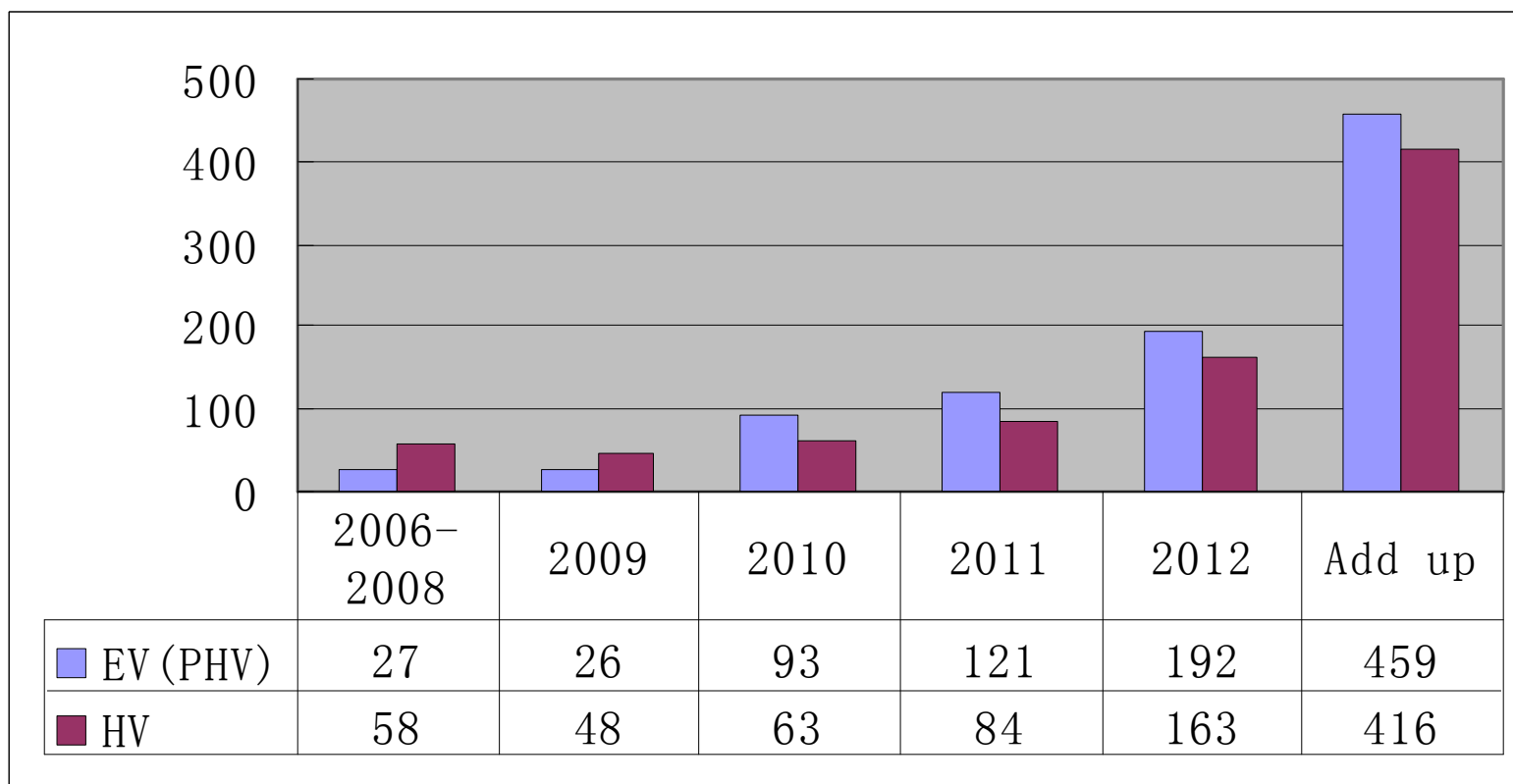
2012, 15495 thousand passenger cars were sold in China.
Chinese government will attempt to double citizens' revenue before 2020. And this plan will promote the passenger cars market continue increase.



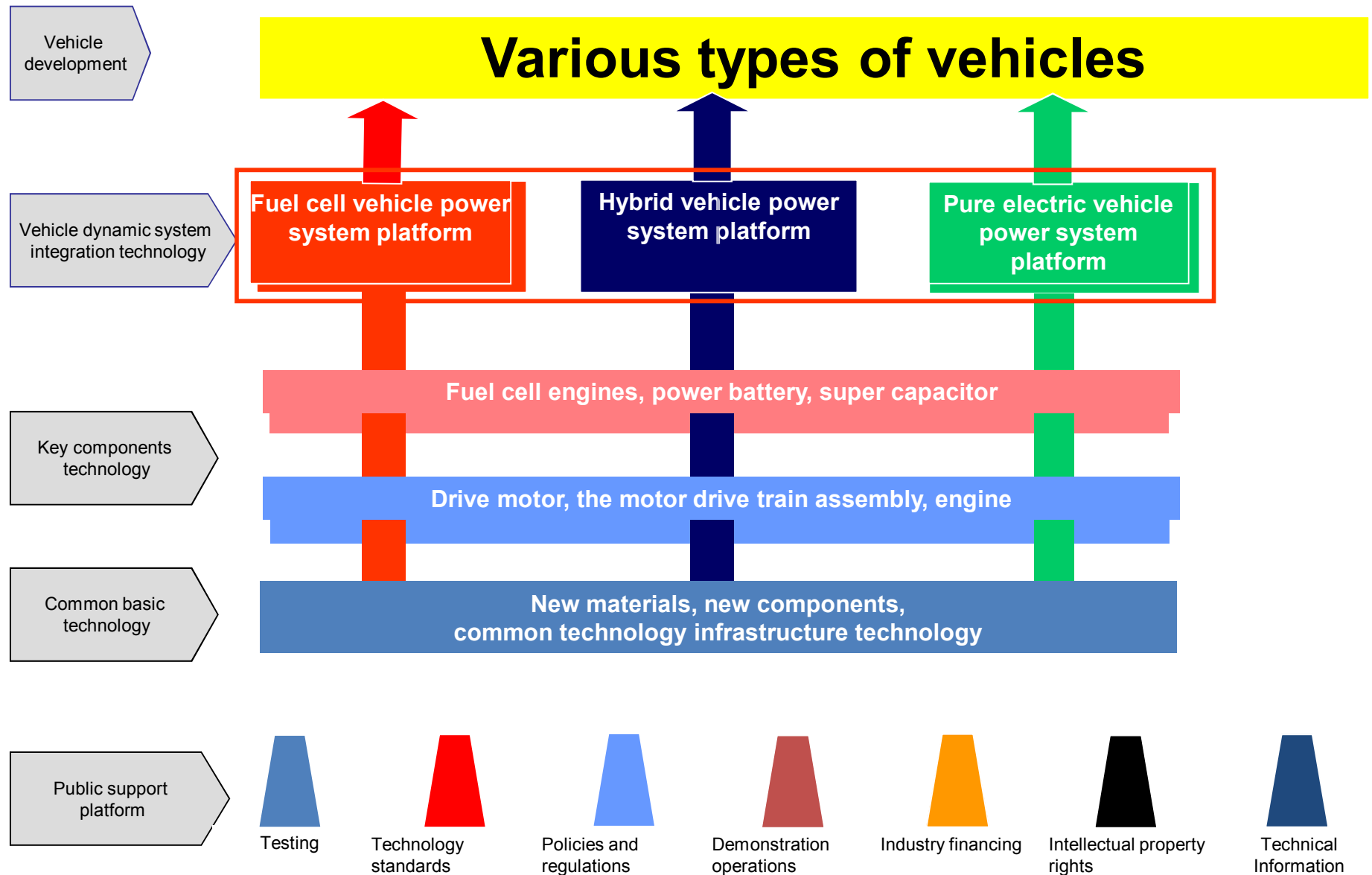
Support Policies from Central Government



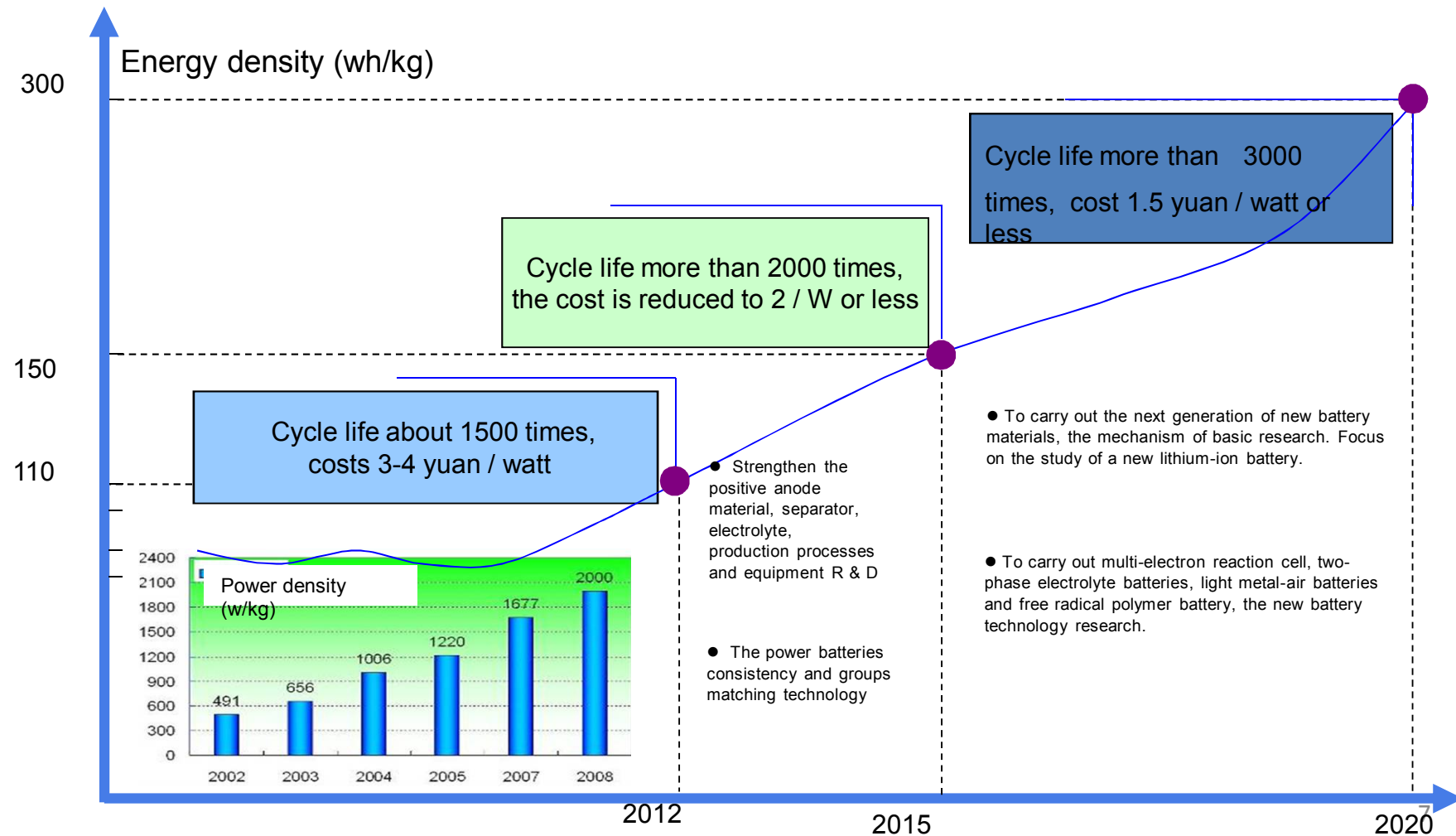
Bulletin number of models of EV(PHV) and HV (2006-2012)



Layout: the major projects of the national energy-saving and new energy vehicles



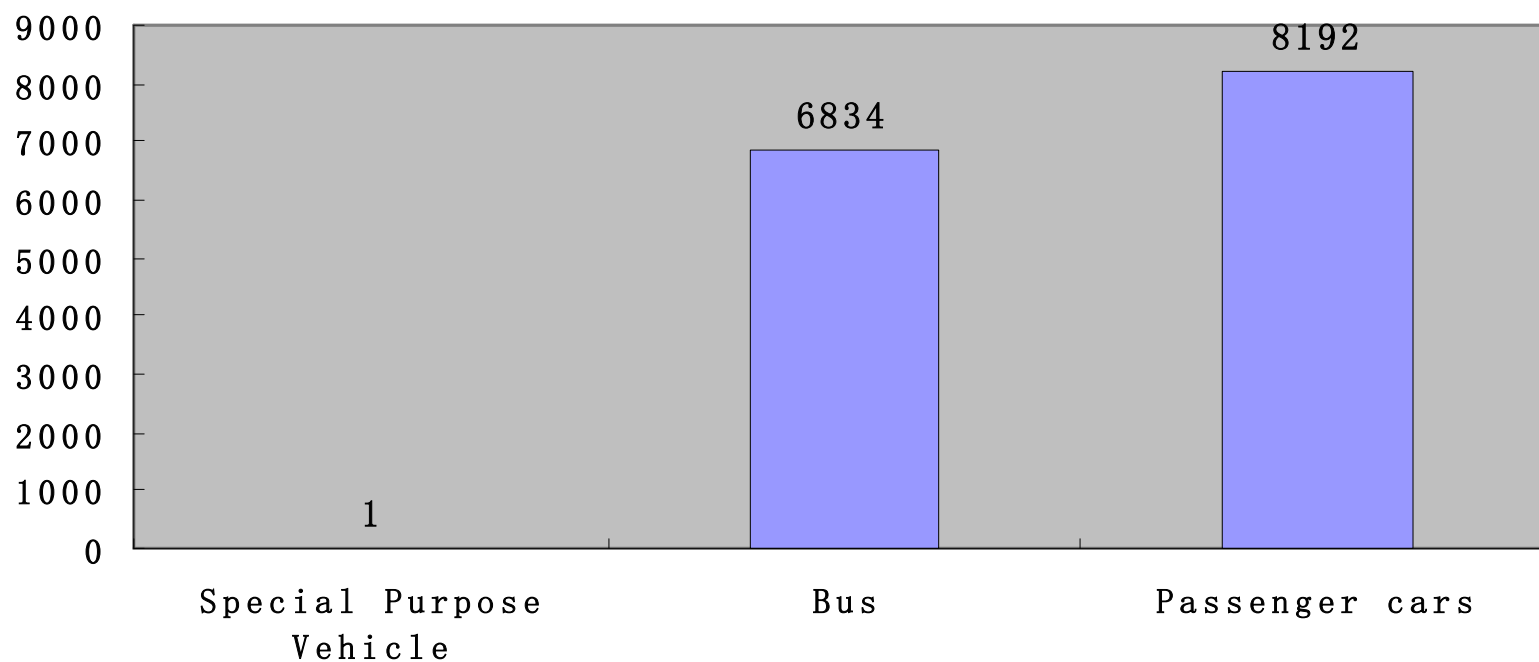
The level of battery technology



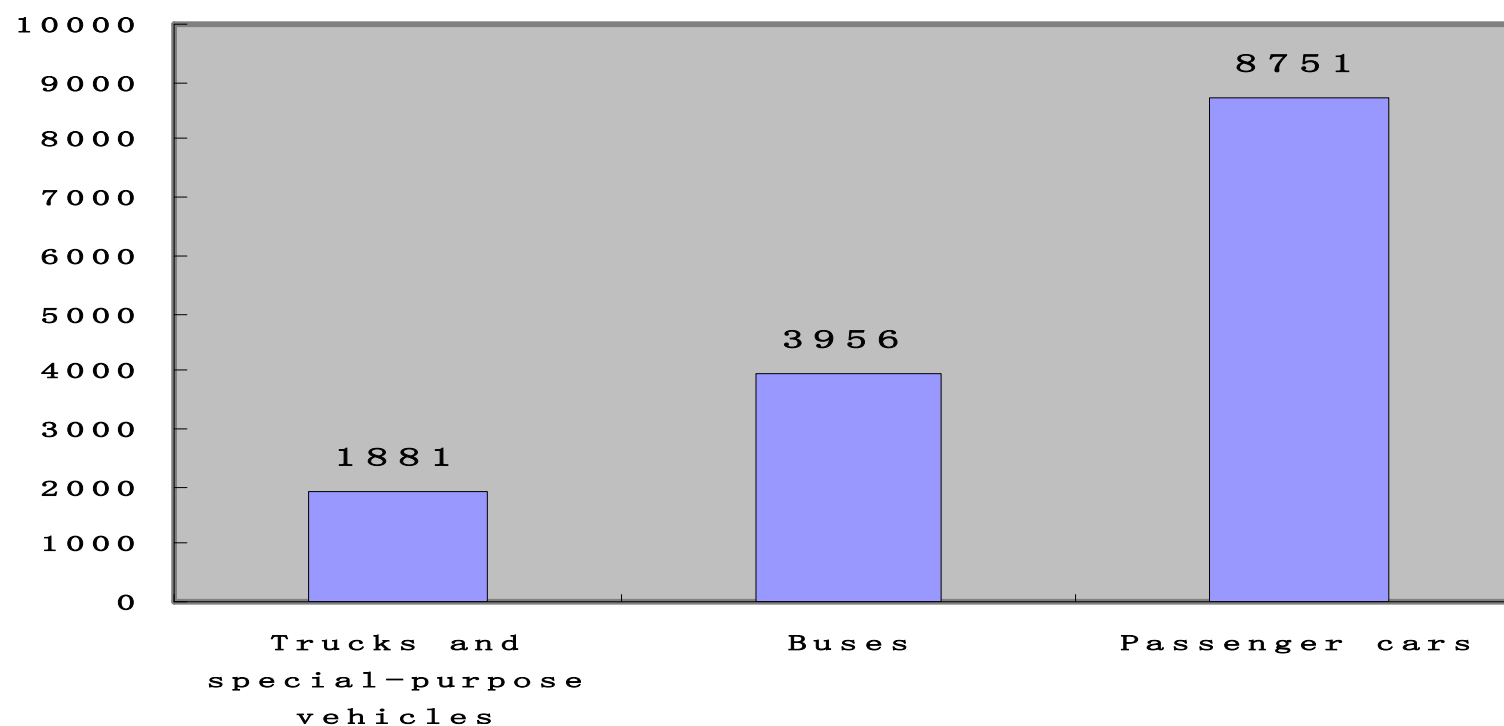
The level of moter technology

Key technical indicators	Industrial energy-saving motors 180ZWS001 	Domestic typical permanent magnet motors 274YZ-XI 02 	Typical domestic asynchronous motors TYC-168-260 	U.S. typical motor EDM60/90 	Toyota 2010 Pruis 
Peak power (kW)					
Peak torque (Nm)					
Maximum speed (r/min)	1500	11500	6000	10000	13500
Efficiency / efficiency District	92%	94%/70%	91. 2%/70%	90%/50%	94%/75%
Total weight of the motor / controller (kg)	90/18. 5	65/28	99/30	65/35	37. 7/17. 9
Motor / controller power density (kW/kg)	0. 33/1. 62	1. 42/3. 29	0. 91/3. 00	1. 39/2. 57	1. 59/3. 35

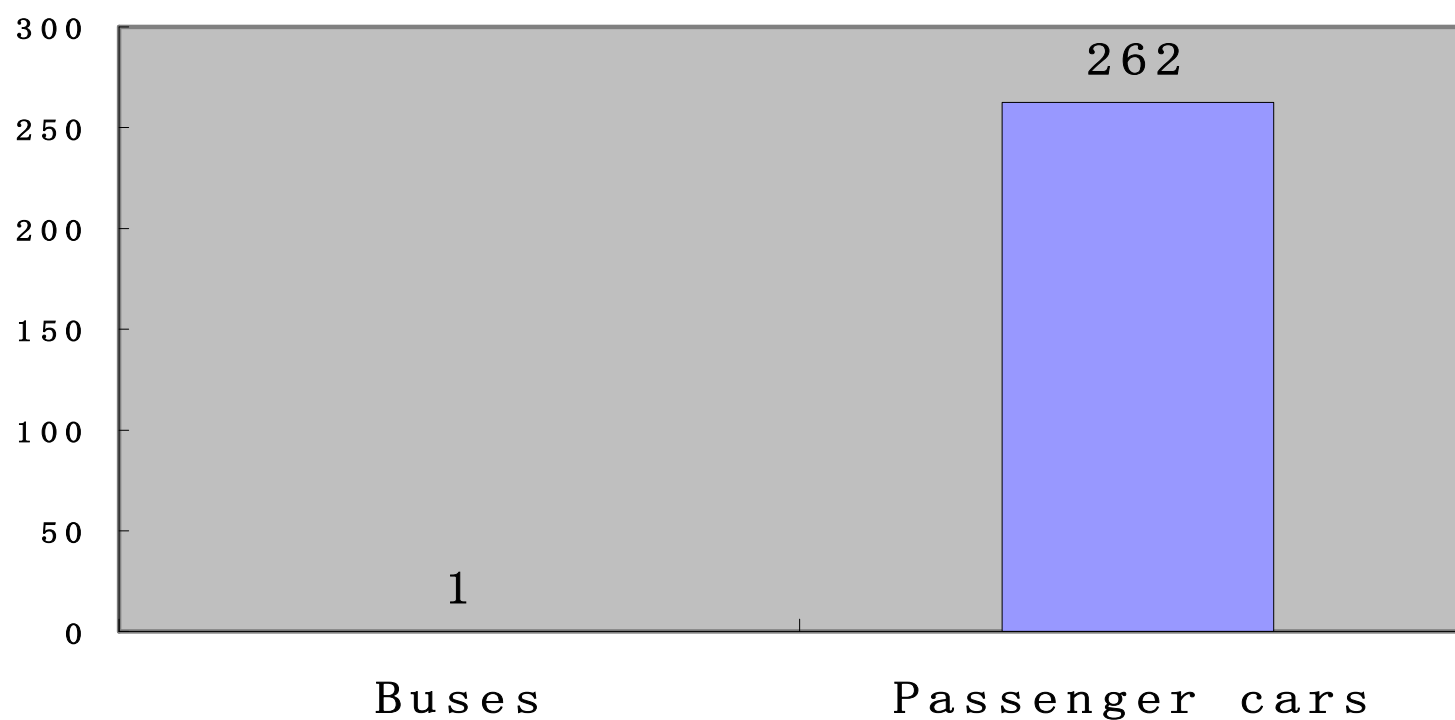
Production of hybrid vehicles in China in 2012



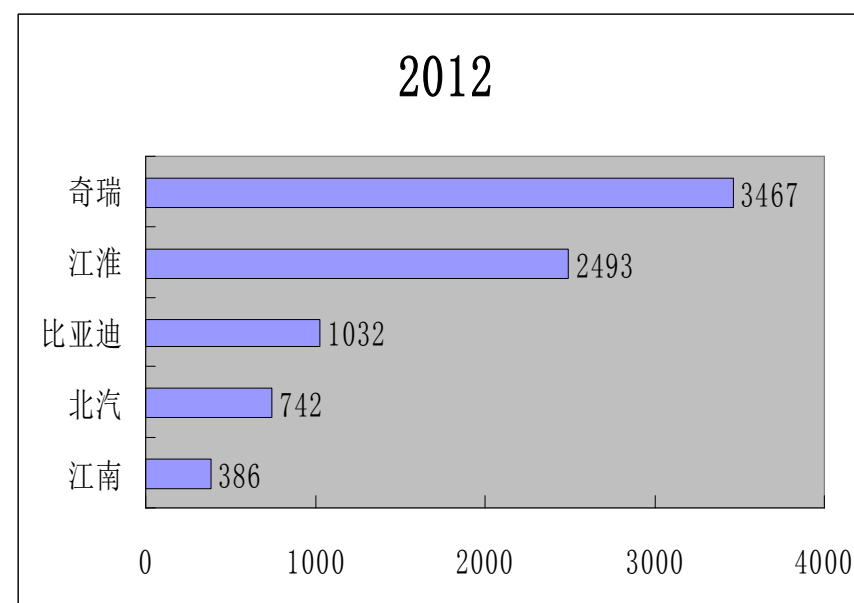
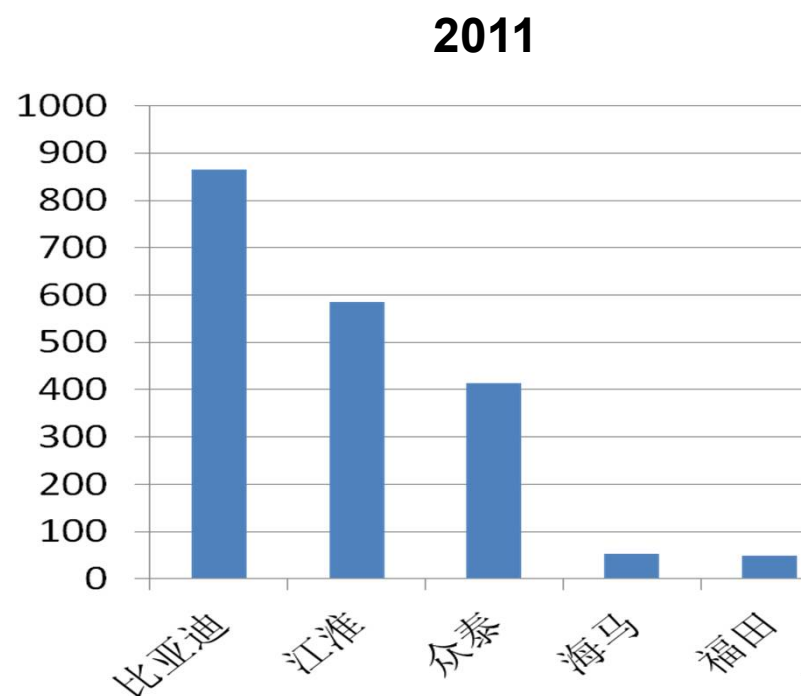
Pure electric vehicle production in China in 2012



Plug-in hybrid production in China in 2012



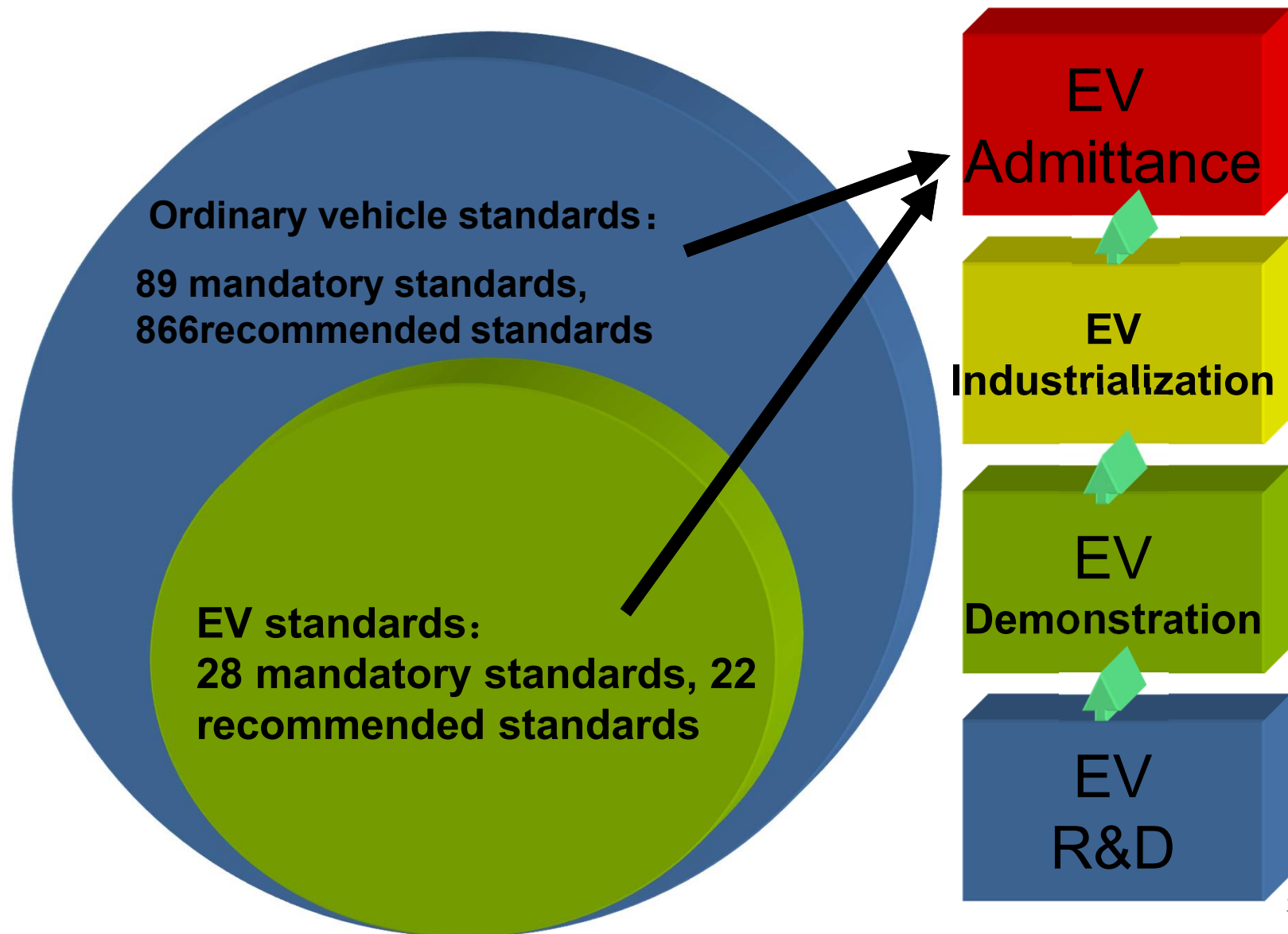
Electric passenger car production in the top five

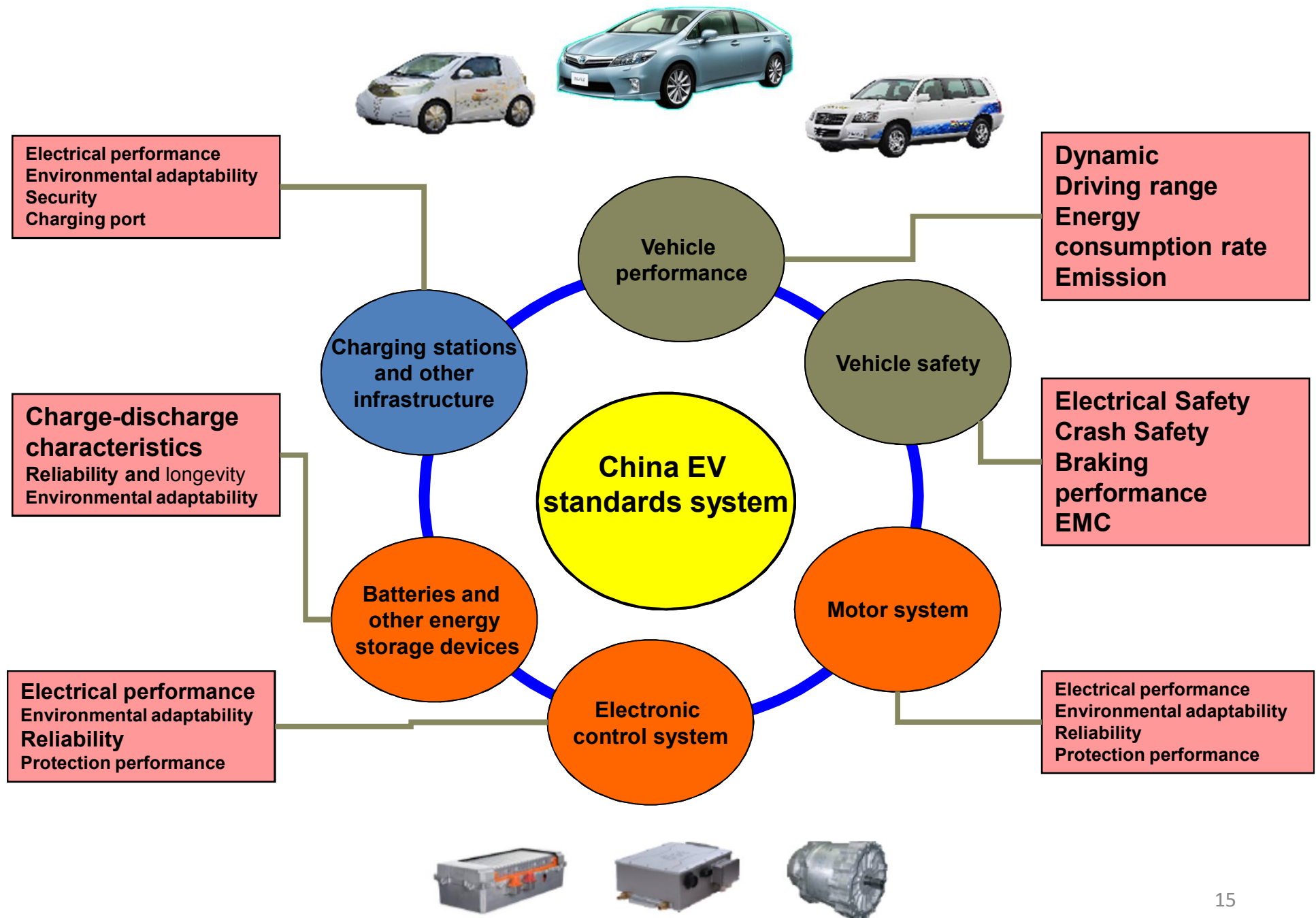


"Pure electric passenger car technology" (GB / T 28382-2012) standard specifies: the maximum speed shall not be less than 80 km / h, mileage must be greater than 80 km.

The low-speed electric vehicles is not officially recognized, but the sales volume is more larger.







1CNY=14.3JPY



荣威 E50 (240,000 CNY)

Rated power / maximum power (Kw)	28/52
nominal / maximum motor speed (rpm)	3000/8000
Peak torque of the motor (Nm)	155
0-50 km / h acceleration time (s)	5.3
0-100 km / h acceleration time (s)	14.6
Mileage(60km/h) (km)	180
Maximum speed (km/h)	130
Slow charge	6h
Fast charge	30min (10%~80%)

比亚迪E6 (370,000 CNY)

Length (mm)	4560
Width (mm)	1822
Height (mm)	1630
Weight (Kg)	2295
Maximum power (Kw)	75
Maximum torque (Nm)	450
Maximum speed (km/h)	140
Power consumption (KWh/100Km)	21.5
Mileage (Km)	300



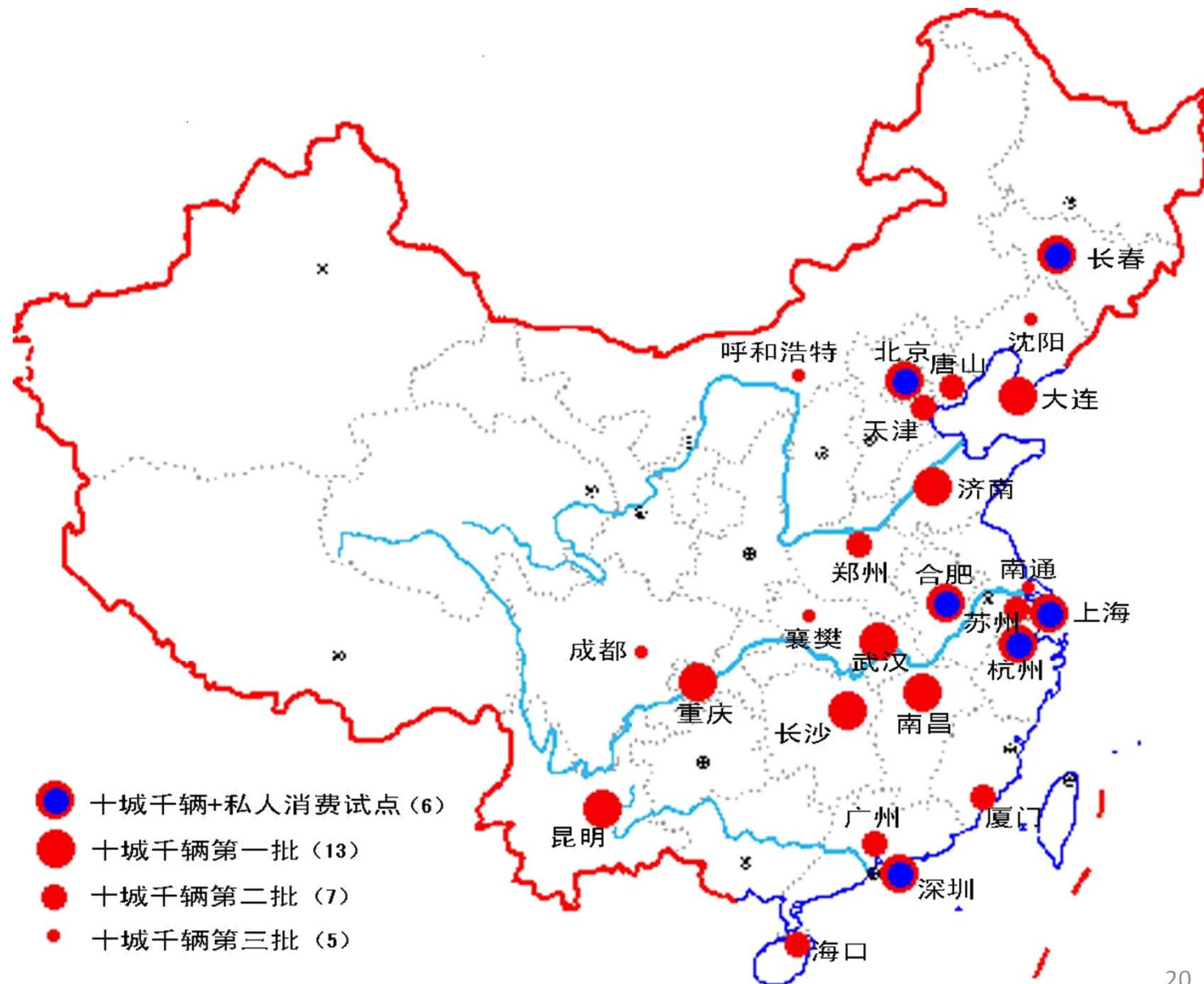


奇瑞QQ3 EV (55,000 CNY)

Length (mm)	3550
Width (mm)	1495
Height (mm)	1485
Weight (kg)	1050
Maximum power (Kw)	12
Maximum torque (Nm)	72
Maximum speed (km/h)	60
Mileage (Km)	100

2. EV demonstration in China

25 cities involved in the EV demonstration plan of our government



Demonstration scale

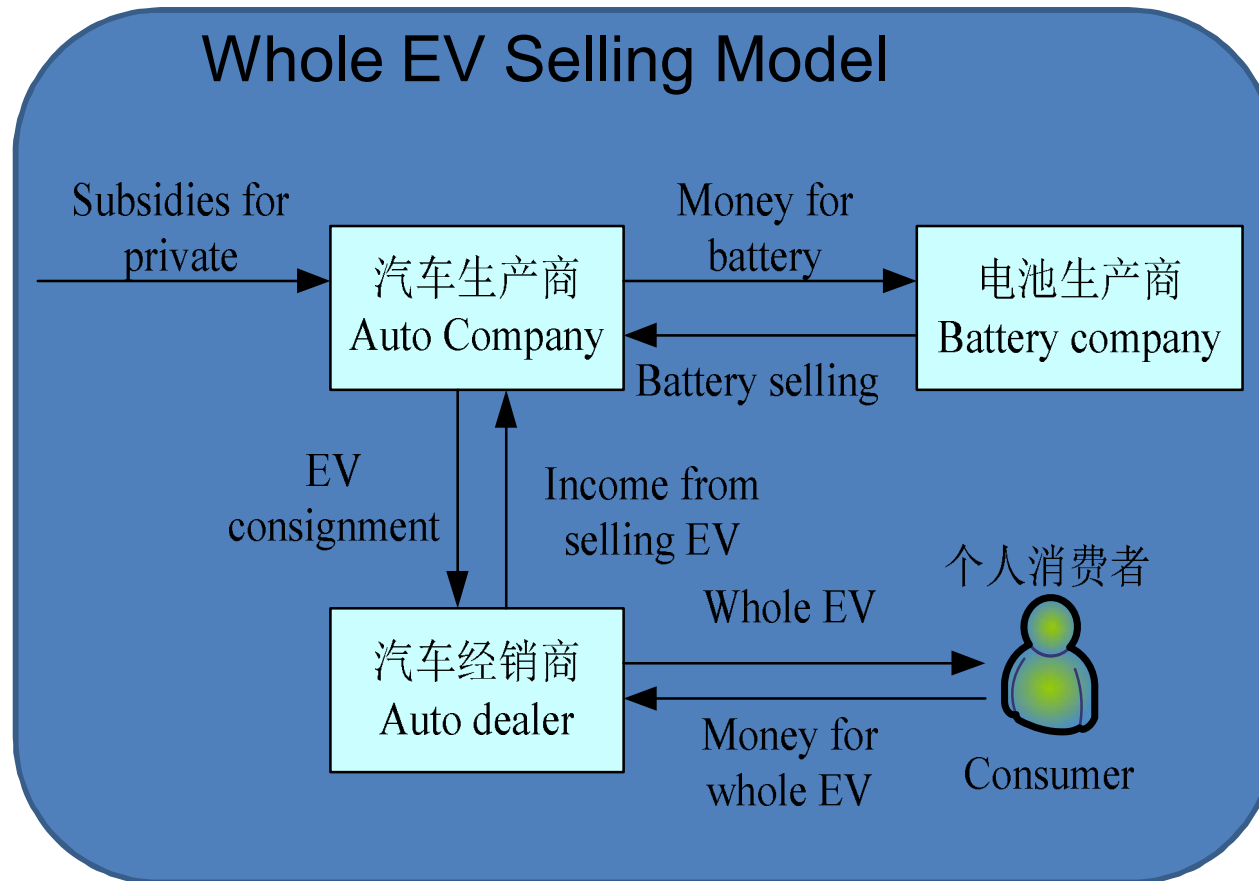
✚ By the end of 2012, the amount of China's total demonstration and extension energy-saving and new energy vehicles (HV, EV & PHV) is 27,400.

✚ Among those, 23,000 for public services; 4,400 for private use.

✚ To the end of March 2013, that amount will reach 39,700.

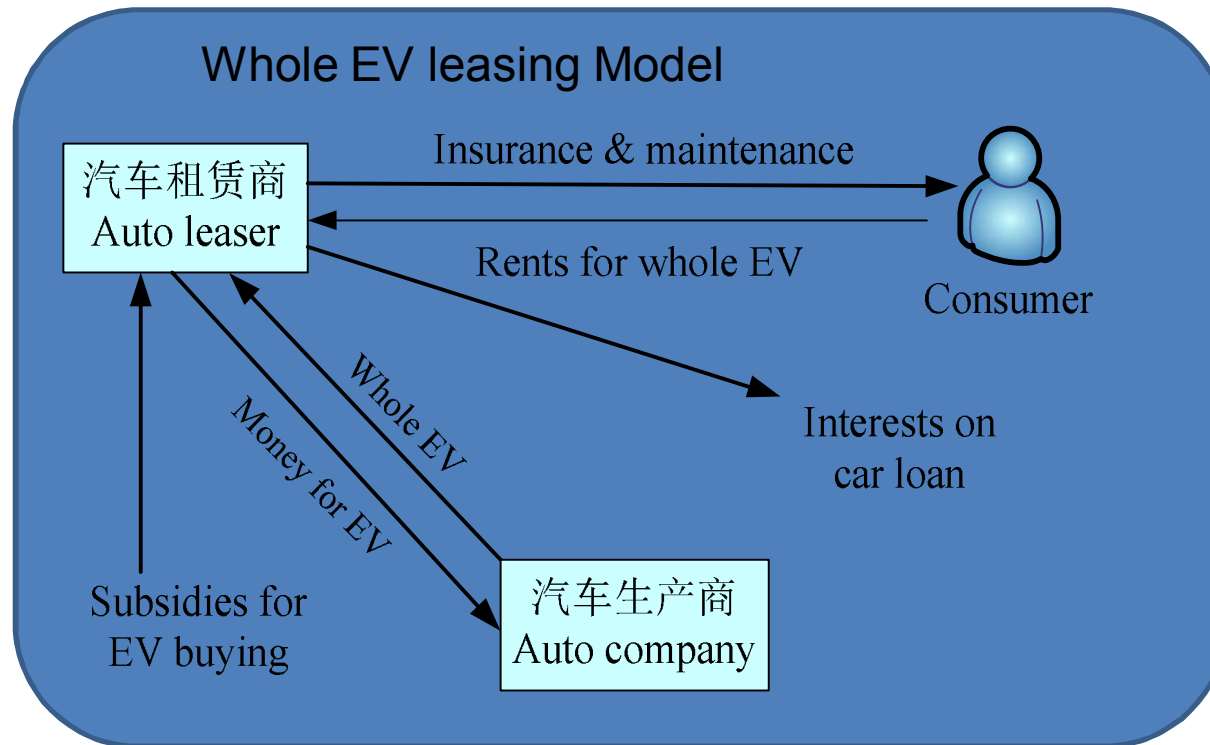
✚ At present, there are 174 charge power stations, 8107 charging piles in China.

EV Business Models of China (1)



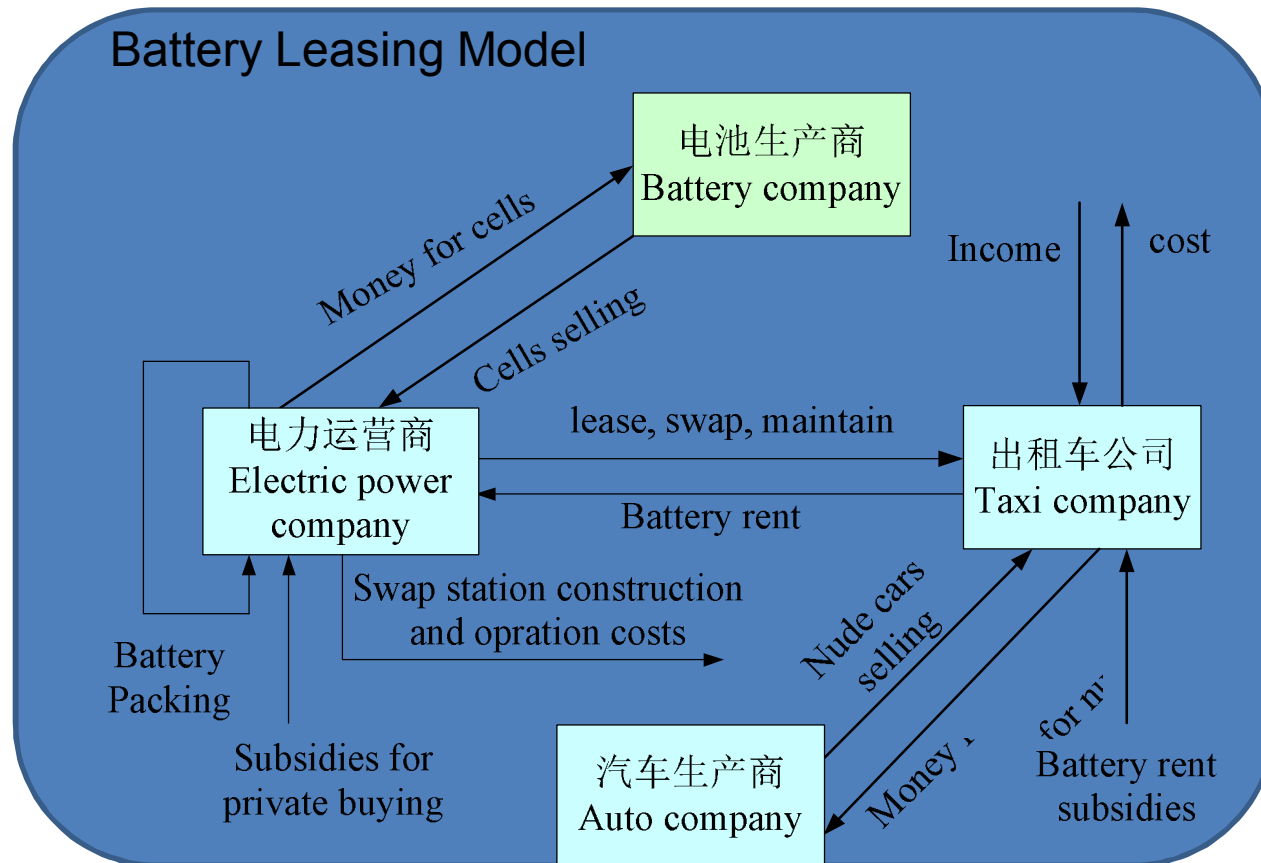
Selling the whole EV at the price of deduction the subsidies, applicable for the small, mini-passenger cars, with some specific consumers

EV Business Models of China (2)



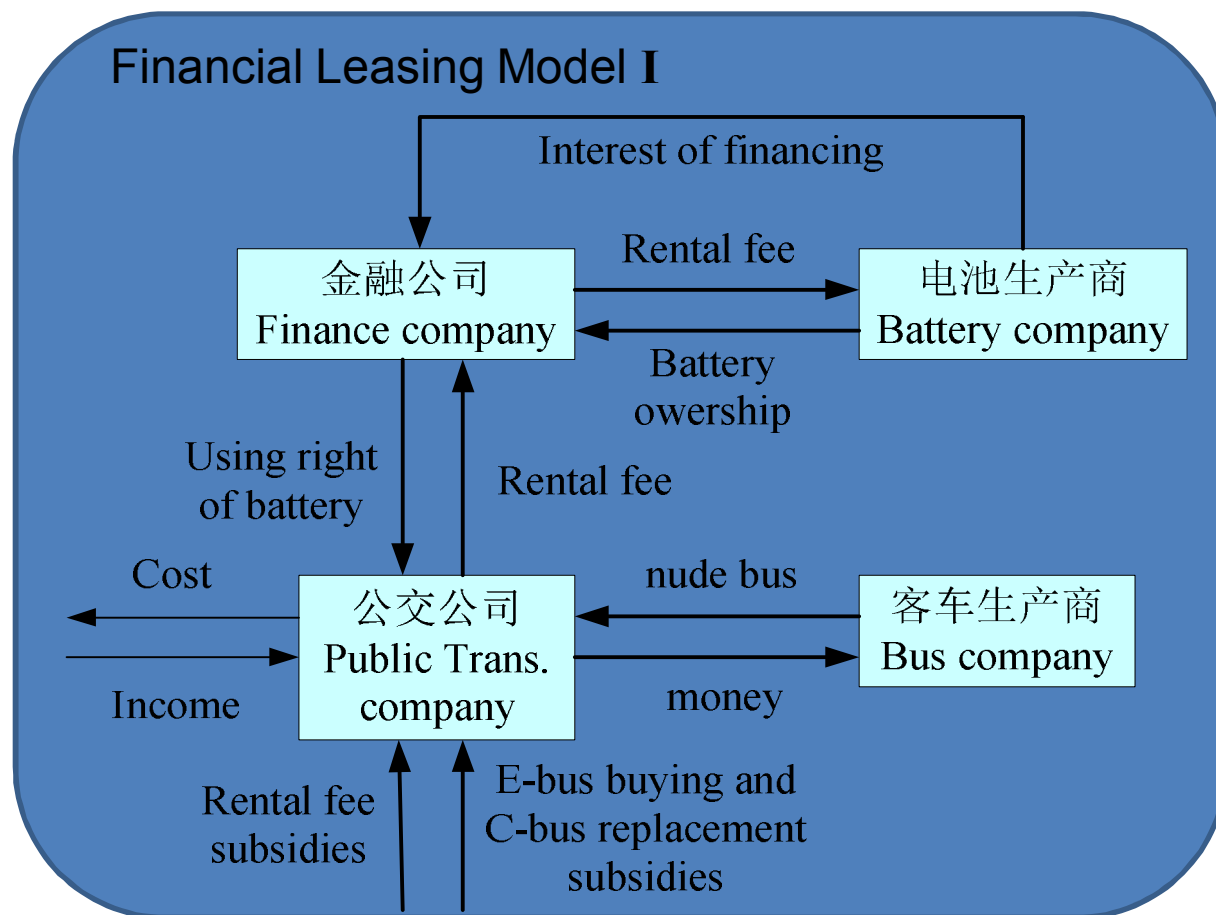
Whole EV leasing model are applied to passenger car for public car leasing market.

EV Business Model of China (3)



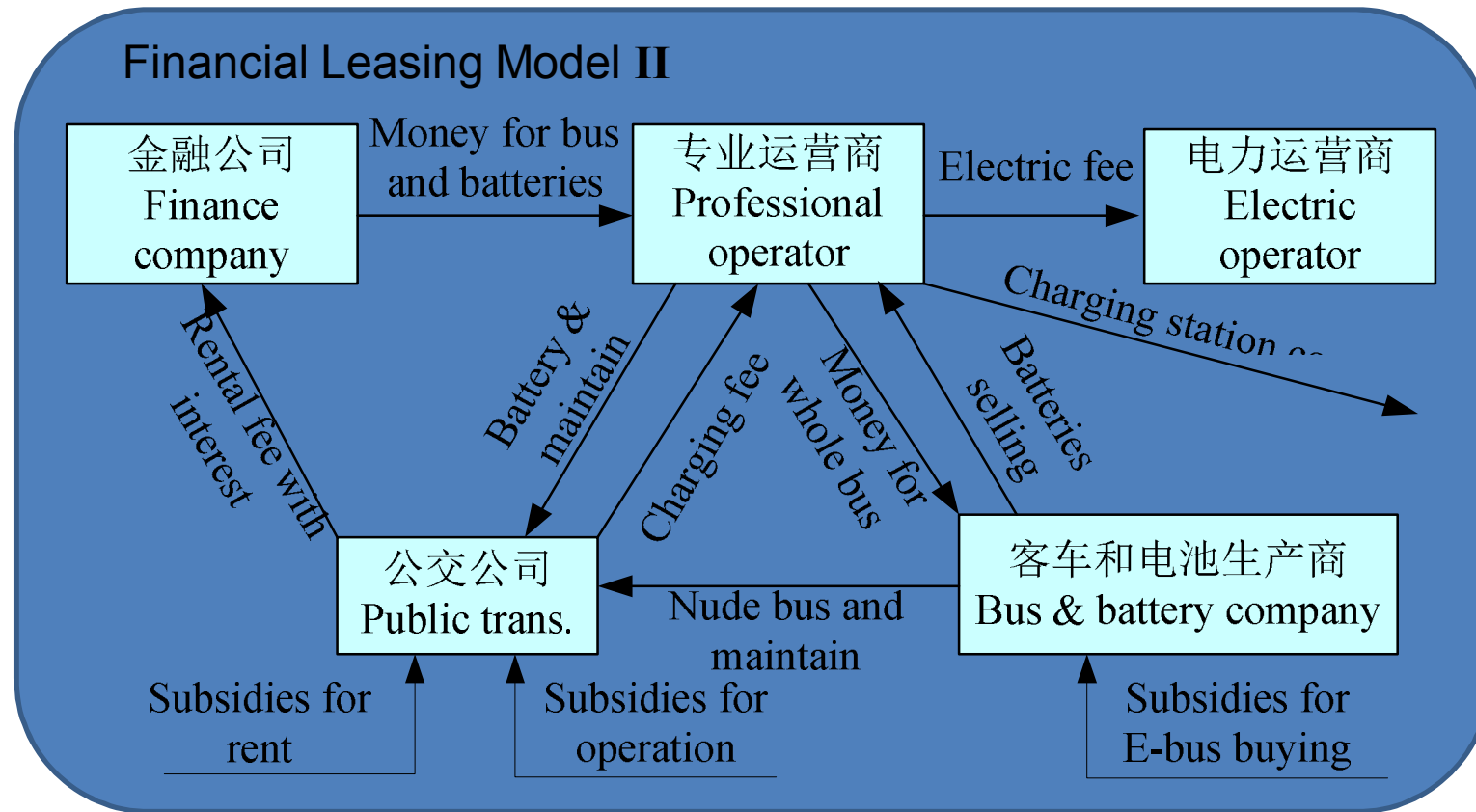
Power company construct and operate the swap station, lease the batteries to taxi company. Power company get the subsidies for private EV buying, and also the subsidies for leasing batteries indirectly from taxi company.

EV Business Model of China (4)



Finance company buy the batteries and lease the batteries to public transportation company, who get subsidies cover the money for leasing battery and buying nude e-bus.

EV Business Model of China (5)



Professional operator borrow the money to buy batteries and nude e-buses, which will be repaid by subsidies. Different from model I, finance company does not own the batteries.

EV Business Models in Demo Cities

Hangzhou
(ZOTYE EV)



Battery Leasing Model



Whole EV Selling Model

Hefei
(JAC EV)

Hangzhou
(ZOTYE 5008EV)



Whole EV Leasing Model

EV Business Model

Hefei
(Ankai Bus)



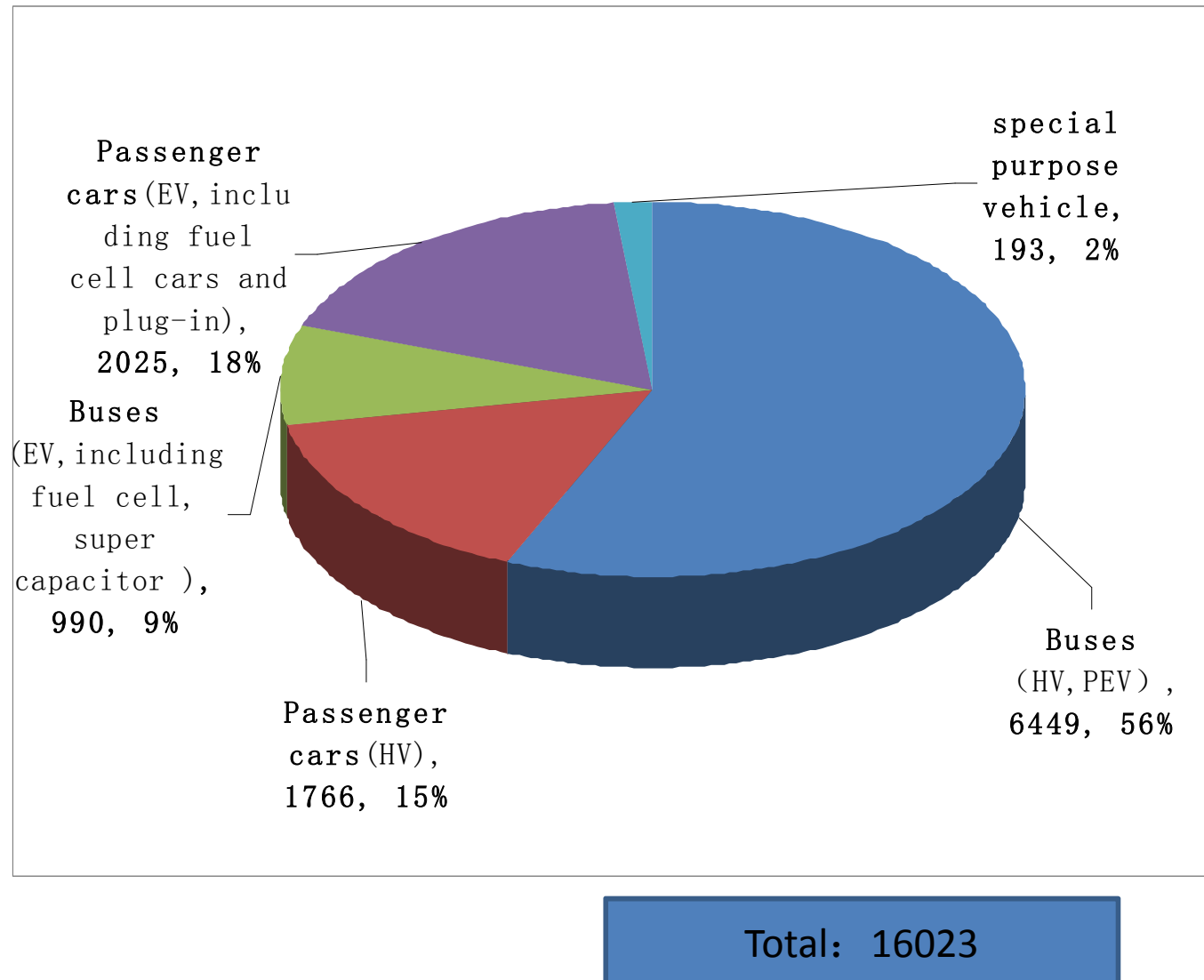
Financial Leasing Model I



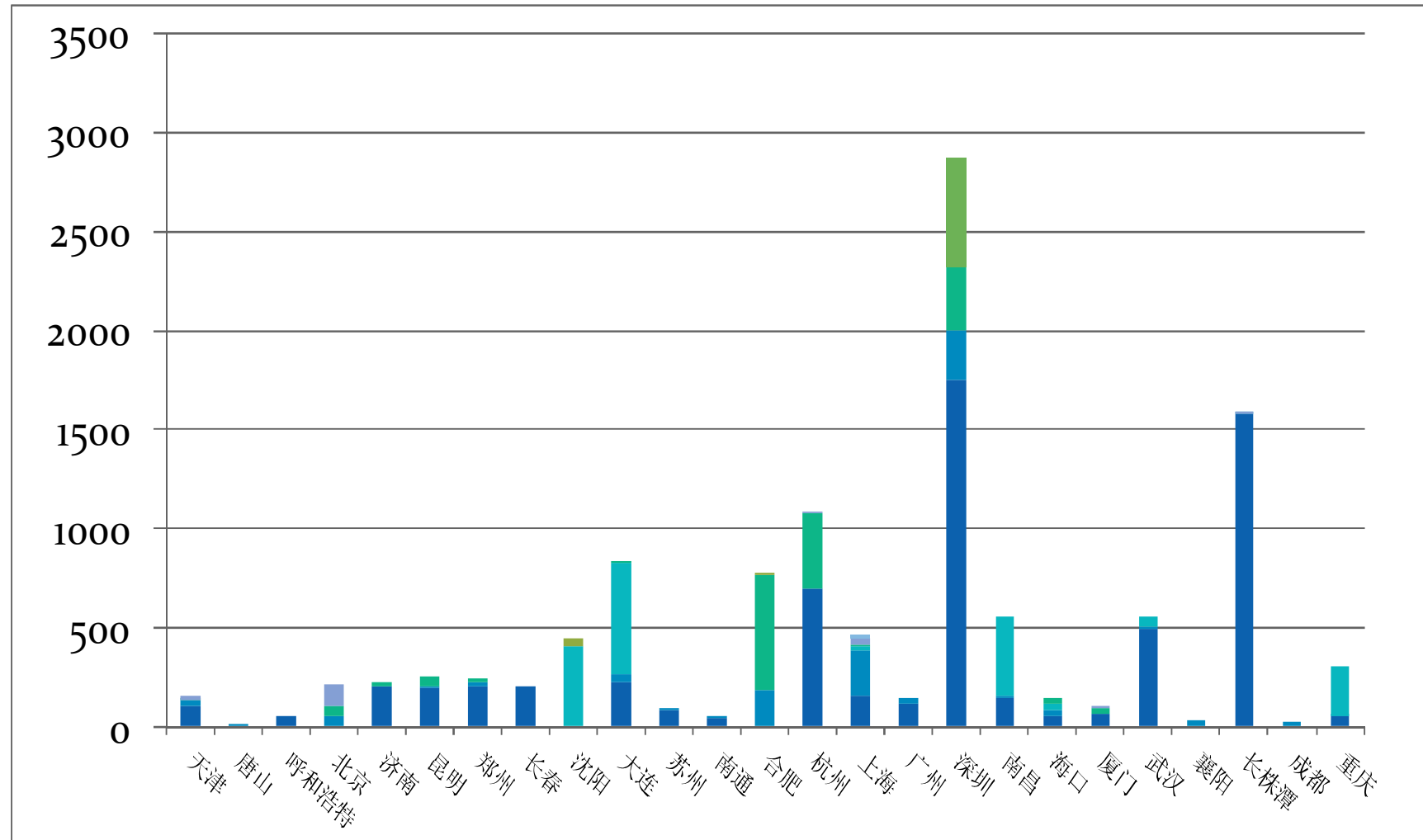
Financial Leasing Model II

Shenzhen
(BYD K9 Bus)

At the end of 2011, the total quantity and variety of demonstration electric vehicles was as follow



- The number of vehicles distributed by city (2011)



Charging Station

Hangzhou,
By State Grid



Charging and Swap station



Charging station

Shenzhen,
By Potevio

Hefei,
By State Grid



Charging station

EV Charging Station

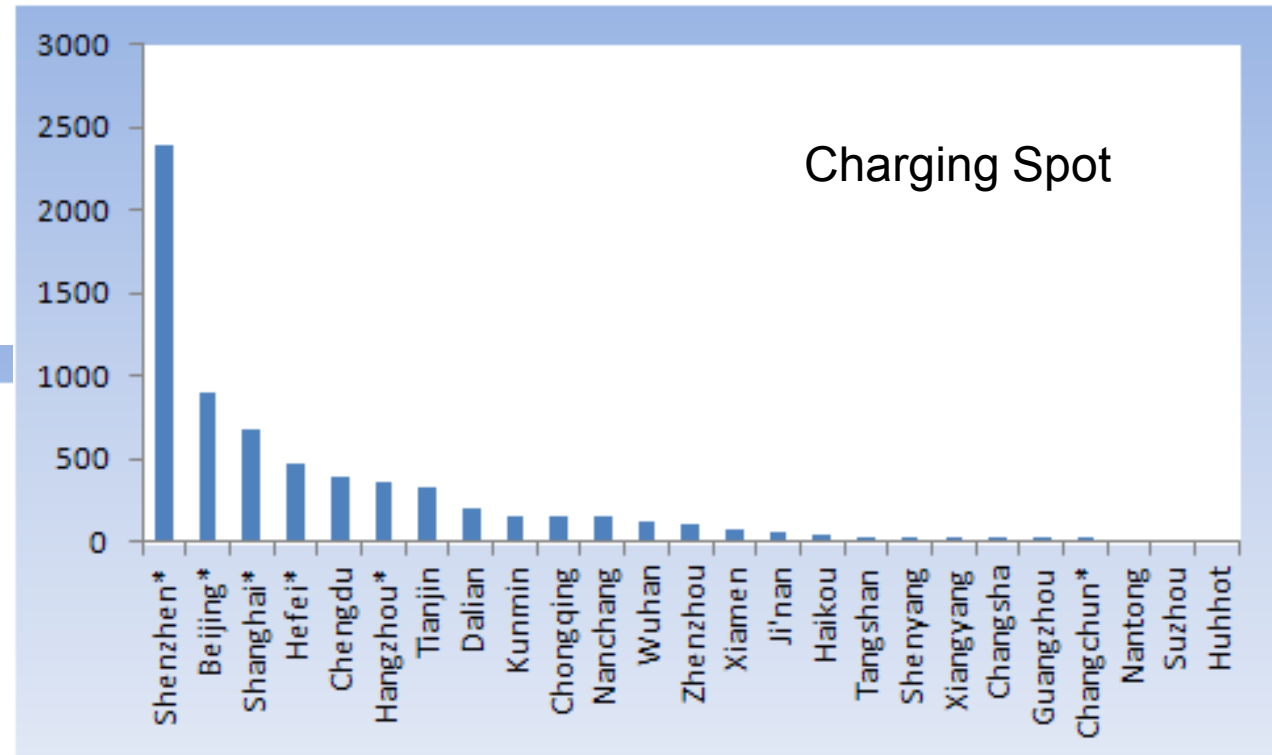
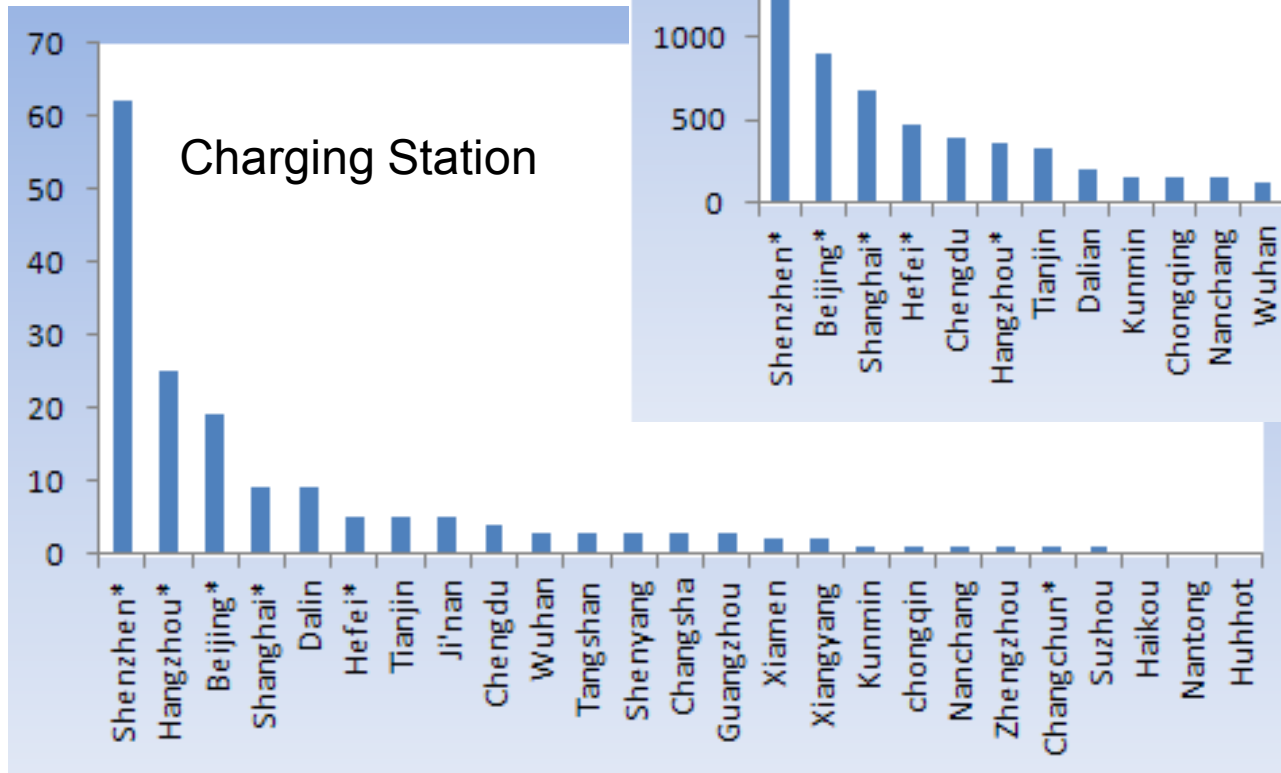


Charging and Swap station

Beijing,
By State Grid

Number of Infrastructures in total

By the end of 2011, the number of charging spots is about 6800 in China



By the end of 2011, the number of charging stations is about 168.



In ShenZhen city, With a measure of exempting five-year license fee, the first pure electric taxi operation company of China was established. 300 pure electric taxis were put into the demonstration, whose daily average mileage was up to 450 km, and of which the longest single mileage reached 220,000 km (till 2012.07).





Till to June 2012, the total amount of NEV in Shenzhen had been up to 3,147, including 2,050 buses (1,771 hybrids, 253 pure EVs, 26 pure electric midibuses), 300 pure electric taxis, 62 fuel cell vehicles, 20 official cars, over 715 private cars. 2,600 charging poles and 62 charging stations (57 for public, 5 for private) had been built up.





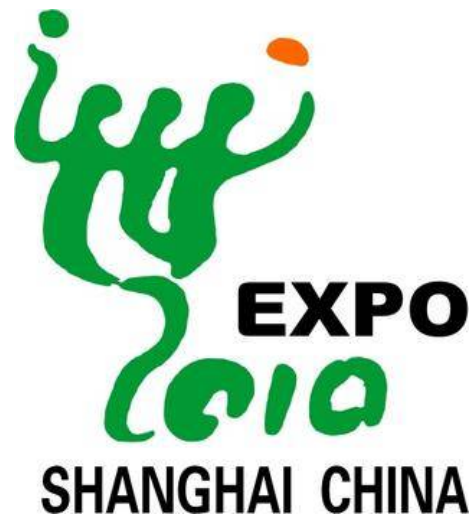
According to the characteristics of moderate mileage and fix route, public buses were selected as a breakthrough to expand NEV promotion scale. Up to now, the number of applications of new energy bus has been up to 2,050, accounting for 12.8% of the population of the city bus in Shenzhen.



Multinational auto companies cooperated with CATARC, to carry out test run of EV in China

BMW	MINI E	Active E	User
Amount	50	100	Government, research institutions, and the general public
TOYOT	PRIUS	IQ-EV	User
Amount	40	5	Government, research institutions

The demonstration features: government-led,
combined with the large-scale events.



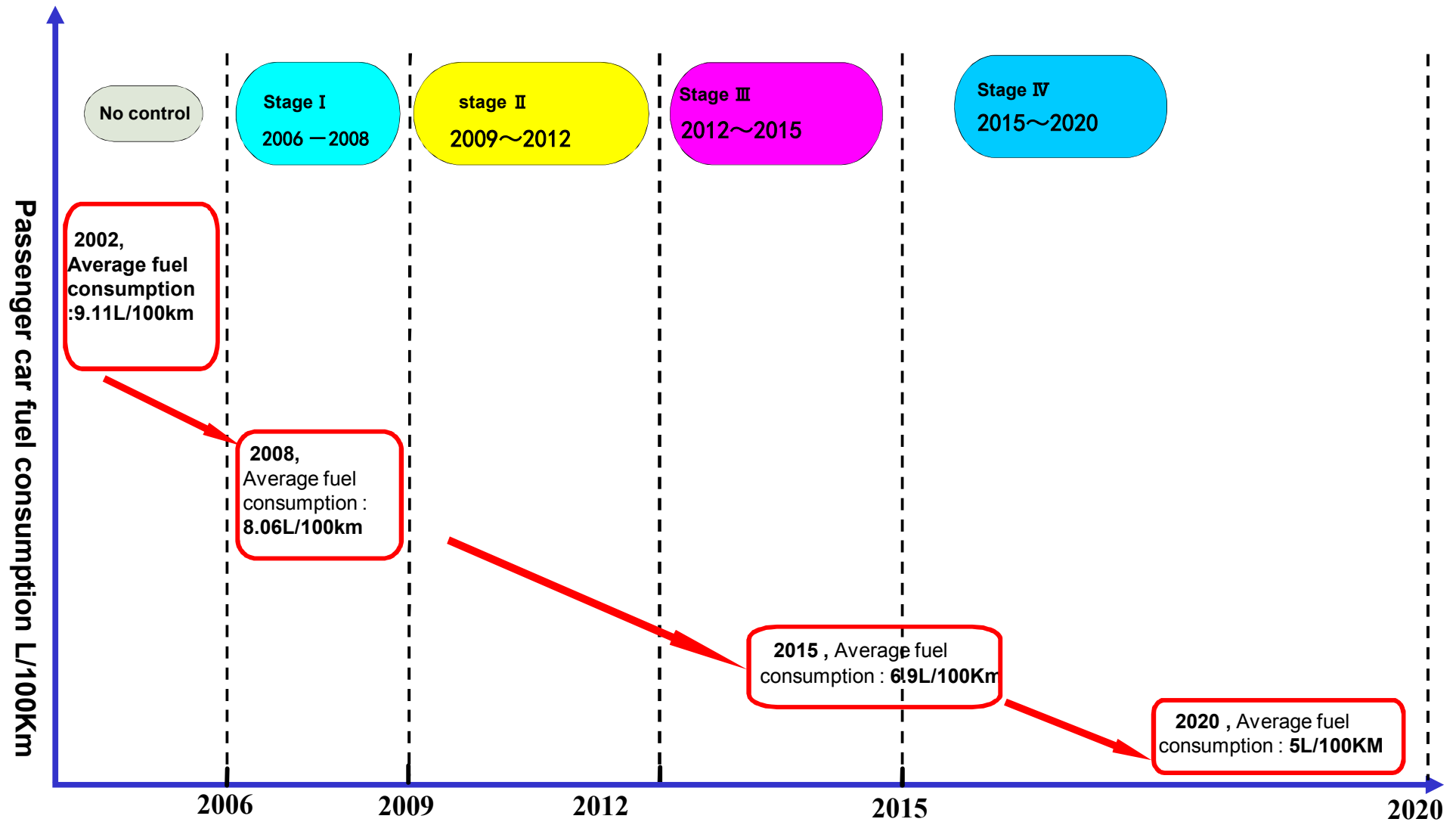
3. Chinese EV development plan

2012, The Chinese State Council issued the "energy-saving and new energy automotive industry development plan (2012-2020)" :

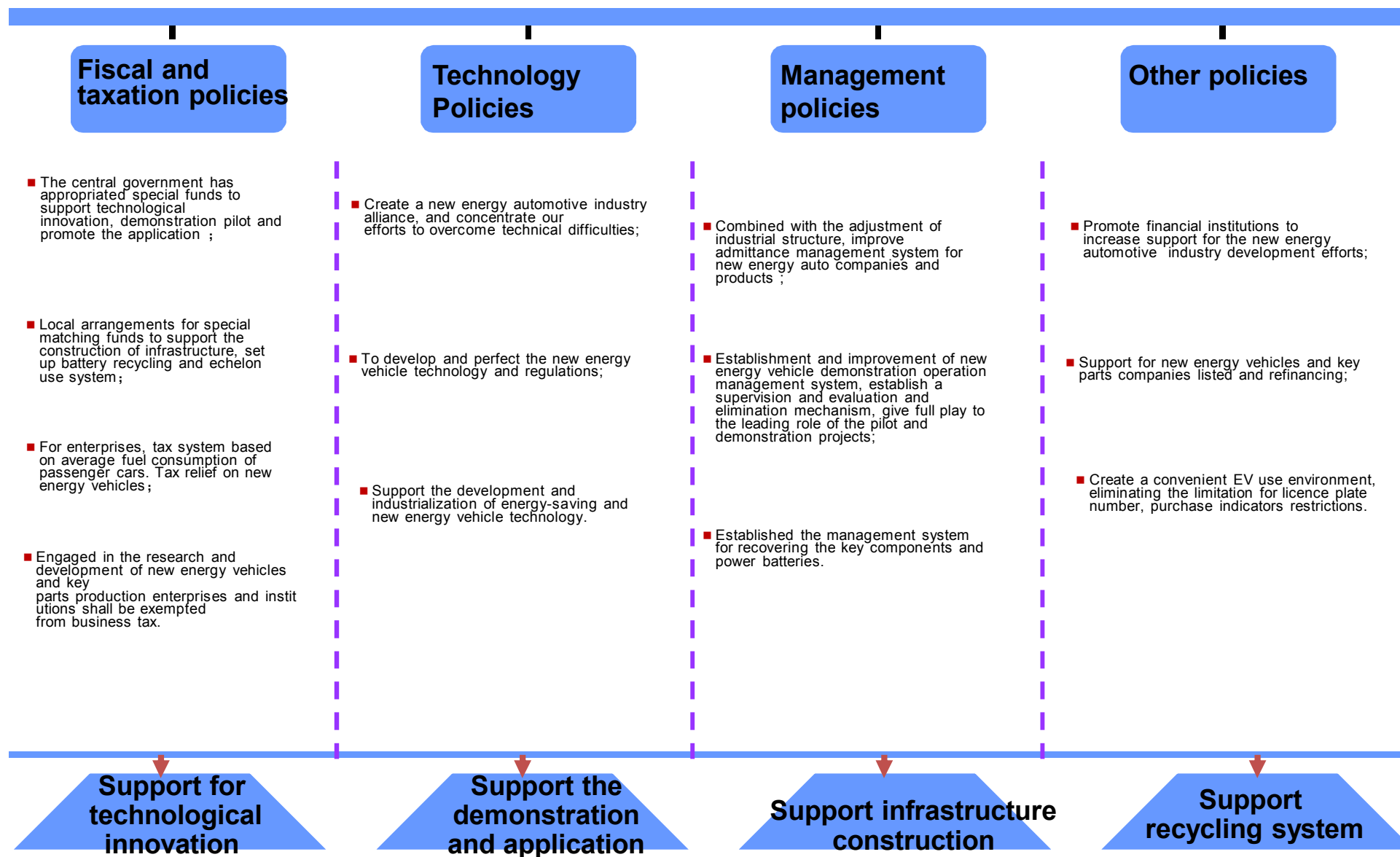
✓2015, strive to cumulatively produce and sale EV and PHV 500,000;

✓2020, EV and PHV production capacity reach 2 million, the cumulative production and sales over 5 million.

Automotive energy-saving control



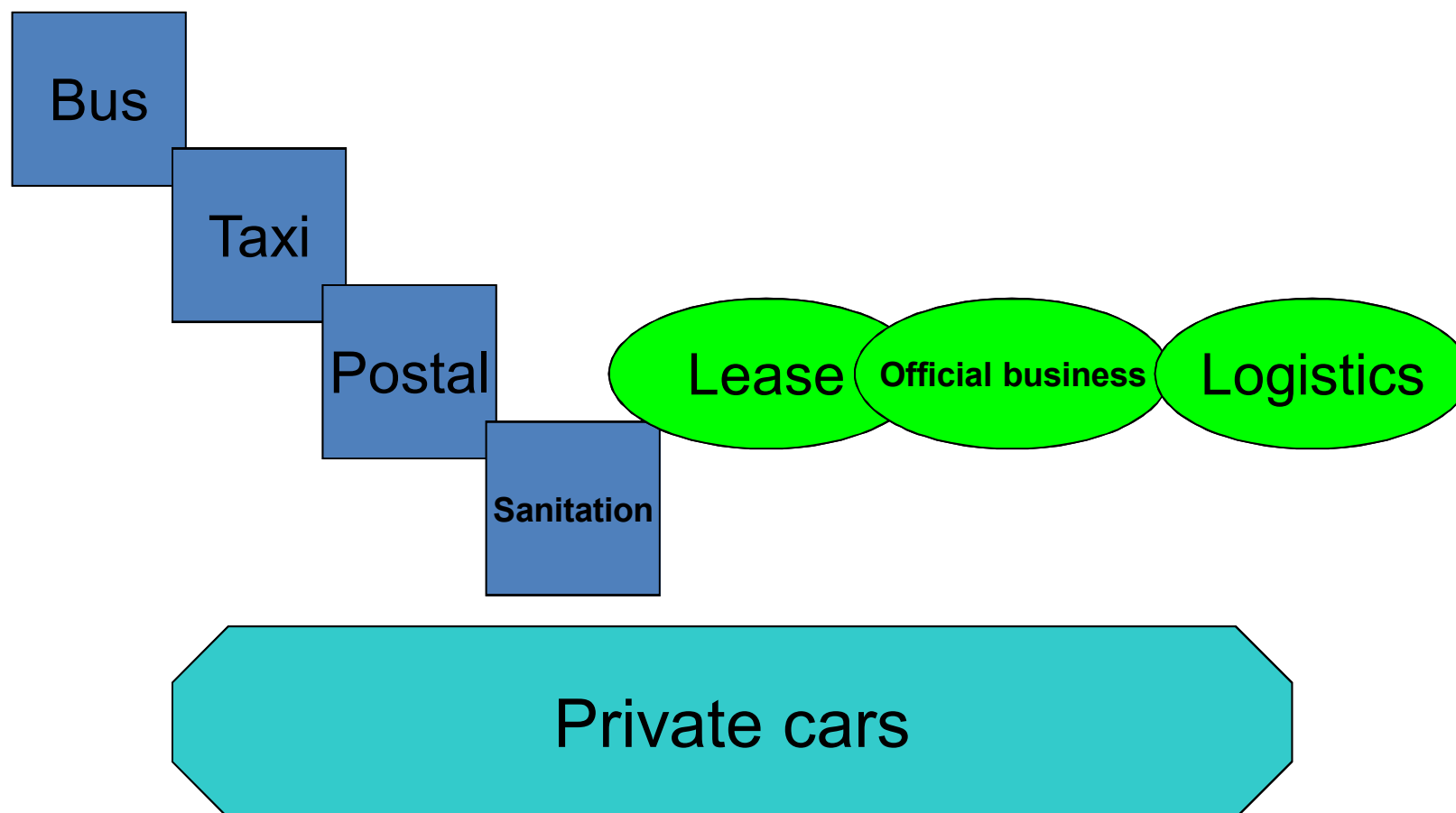
4. Measures to promote the application of EV in China



City	Car ownership	Restriction measures	Promotional measures for EV
Beijing	5,200,000	20,000 indicators per month, ballot	Production enterprises per vehicle subsidies 60,000 most (central financial); Private purchase of each vehicle subsidies 60 000 most (local government); Free license fee or without balloting.
Shanghai	2,600,000	10,000 indicators per month ,Bid (75,000)	
Canton	2,500,000	10,000 indicators per month ,Ratio of EV/PHV: ballot: bid is 1:5:4	



How to achieve the goals of the plan.....



5. Some views about Chinese EV market

- Under the pressure on energy and environmental protection, in Chinese cities, electric vehicles will rapidly increase.
- In the field of private vehicles, EV should use fast charging model (less than 10 to 15 minutes is perfect. On the other hand, to improve mileage, increasing the battery is necessary, that cause charging time grow).
- PHV is a good transition (the financial subsidies less than EV).
- In many Chinese residential area, parking spaces are leased to vehicle owner, and charging pile construction will take up some of the land, so parking charging piles is not easy to achieve.
- As EV charging stations increased, in order to reduce the impact on the grid, to stabilize the electricity peak-to-valley, more new distributed energy storage (Distributed Energy Storage, DES) device will be needed.





2013-7-8 Beijing

huizhan@catarc.ac.cn



EV Technology Innovation Forum

2013-11 Beijing

chinaev@catarc.ac.cn

Thanks for Your attention !