Contents

Forward

In 2009, in order to guarantee steady and rapid economic growth during the global financial crisis, China issued a series of consumer policies to promote sales of motor vehicles and motorcycles. The policies succeeded in stimulating the vehicle market; production and sales increased rapidly as China became the world's largest producer and consumer of vehicles. In 2009, vehicle production and sales totaled 13.791 million and 13.645 million, respectively, representing increases of 48.3% and 46.2% over the previous year.

By the end of 2009, the total population of vehicles in China reached nearly 170 million, up 9.3% from the previous year. The fleet composition was 36.6% motor vehicles, 7.8% low-speed vehicles, and 55.6% motorcycles. As compared with developed countries such as the United States and Japan, China's total motor vehicle population is not large; motorcycles still dominate, accounting for over half of the total vehicle population. By vehicle type, passenger vehicles accounted for 78.0% of all motor vehicles, while goods vehicles accounted for 22.0%. By fuel type, gasoline vehicles accounted for 81.3% of motor vehicles, diesel vehicles accounted for 17.7%, and gas vehicles accounted for 1.0%. By emission standard, 17.1% of motor vehicles met pre-China I standards, 25.7% met the China I standard, 31.8% met the China II standard, and 25.4% met the China III or higher standard. In contrast with Europe, nearly 80% of motor vehicles are gasoline-powered passenger vehicles, and there are approximately equal fractions of vehicles meeting each emission standard. From 1980 to 2009, the annual growth rate of the motor vehicle population was 12.6%. From 2000 to 2009, the annual growth rate of the motorcycle population was 9.6%. In contrast, the population of low-speed vehicles recently has been decreasing due to national policies encouraging rural residents to purchase light goods vehicles.

In 2009, emissions from China's vehicles totaled 51,433,000 metric tons, of which emissions of carbon monoxide (CO) were 40,188,000 metric tons, emissions of hydrocarbons (HC) were 4,822,000 metric tons, emissions of oxides of nitrogen (NOx) were 5,833,000 metric tons, and emissions of particulate matter (PM) were 590,000 metric tons. Among all vehicles, motor vehicles were the dominant contributor, accounting for over 70.0% of total CO and HC emissions and over 90.0% of NOx and PM emissions. According to vehicle type, nationwide emissions of CO and HC from passenger vehicles were clearly much higher than those from goods vehicles, with the largest contributions from small and medium passenger vehicles. In contrast, emissions of NOx and PM from goods vehicles were much higher than those from passenger vehicles, with the largest contributions from heavy and medium goods vehicles. According to fuel type, emissions of CO and HC from gasoline vehicles were much higher than those from diesel vehicles, accounting for over 70% of emissions. In contrast, diesel vehicles emitted almost 60% of NOx emissions and over 90% of PM emissions. According to emission standard, motor vehicles meeting pre-China I standards, though only comprising 17.1% of the total fleet, emitted over 50% of total pollution. The 25.4% of vehicles meeting China III or higher standard only emitted 6% of total pollution. Therefore, it is clear that the implementation of strict emission standards has had a huge impact. From 1980 to 2009, national emissions from motor vehicles have shown an increasing trend. From 1980 to 2000, total emissions grew in accordance with total vehicle population. However, after 2000, the increase in pollution emissions began to slow, owing to the continued introduction of strict vehicle emission standards and scrappage of high-emitting "yellow-label vehicles."

After 30 years of development, China's vehicle emission prevention and control system and management capacity has been basically established. The system of relevant laws, regulations, and standards has continued to be improved; environmental management systems for new vehicles, in-use vehicles, and vehicle fuels have been basically established.

Part I: National Vehicle Population

1. Current Situation of Vehicle Population

By the end of 2009, the total population of vehicles in China reached 169.935 million, of which 62.094 million were motor vehicles, 13.310 million were low-speed vehicles, and 94.531 million were motorcycles. Motor vehicles, low-speed vehicles, and motorcycles accounted for 36.6%, 7.8%, and 55.6%, respectively, of the entire vehicle fleet. As compared with 2008, the total vehicle population increased 9.3%, in which the population of motor vehicles increased 21.8%, the population of low-speed vehicles decreased 10.8%, and the population of motorcycles increased 5.6%. Figure 1 shows the composition of China's vehicle fleet in 2009.

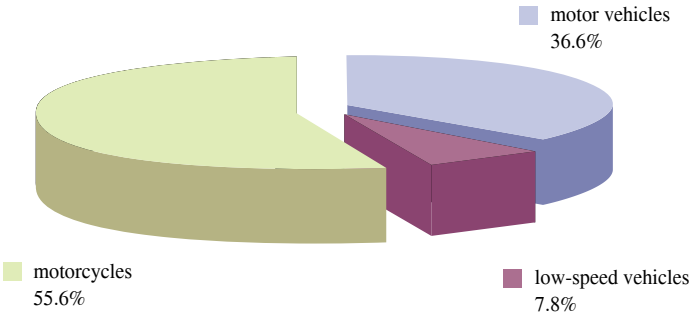


Figure 1. Composition of China's vehicle fleet in 2009

1.1 Motor Vehicle Population by Vehicle Type

By the end of 2009, among motor vehicles, the population of passenger vehicles reached 48.408 million, accounting for 78.0% of the total fleet. Among passenger vehicles, the population of mini passenger vehicles was 4.088 million, the population of small passenger vehicles was 41.248 million, the population of medium passenger vehicles was 1.806 million, and the population of large passenger vehicles was 1.266 million. The total population of goods vehicles reached 13.686 million, accounting for 22.0% of the total motor vehicle fleet. Among goods vehicles, mini, light, medium, and heavy goods vehicle populations reached 0.371 million, 7.839 million, 3.035 million, and 2.441 million, respectively. Figure 2 shows motor vehicle population by vehicle type.

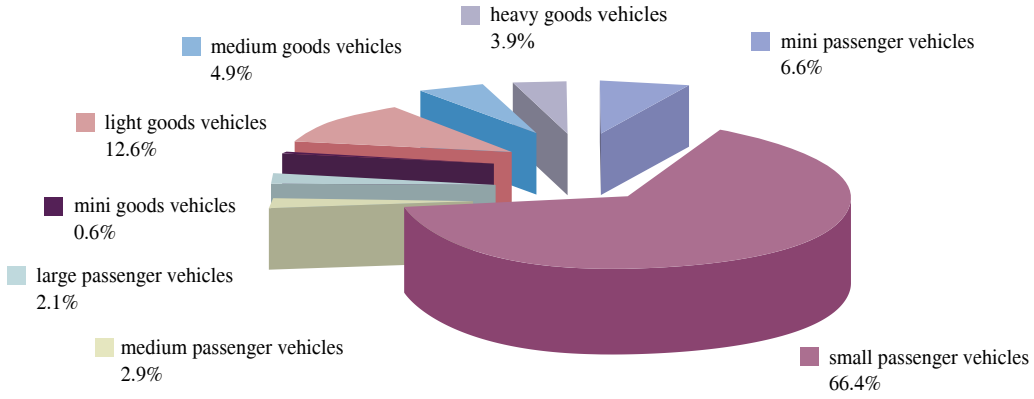


Figure 2. Motor vehicle population by vehicle type

1.2 Motor Vehicle Population by Fuel Type

By the end of 2009, the population of gasoline motor vehicles reached 50.507 million, accounting for 81.3% of all motor vehicles. The population of diesel vehicles reached 10.960 million, accounting for 17.7% of all motor vehicles. The population of gas vehicles reached 627,000, accounting for 1.0%. Figure 3 shows China 2009 motor vehicle population by fuel type.

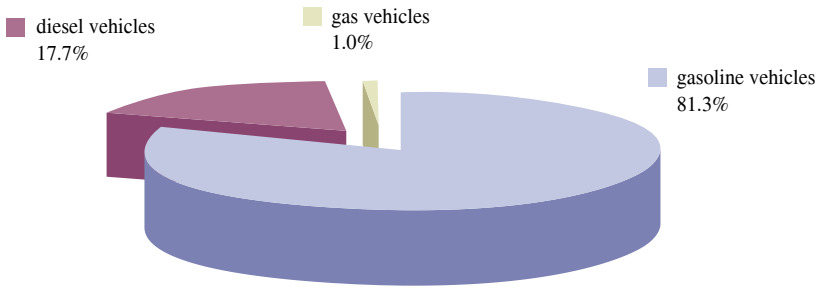


Figure 3. Motor vehicle population by fuel type

1.3 Motor Vehicle Population by Emission Standard

By the end of 2009, the population of vehicles meeting pre-China I standards reached 10.621 million, accounting for 17.1% of all motor vehicles. The population of vehicles meeting the China I standard reached 15.987 million, accounting for 25.7% of motor vehicles. The population of vehicles meeting the China II standard reached 19.731 million, accounting for 31.8% of motor vehicles. The population of vehicles meeting the China III or higher standard reached 15.755 million, accounting for 25.4% of motor vehicles. Figure 4 shows China's 2009 motor vehicle population by emission standard.

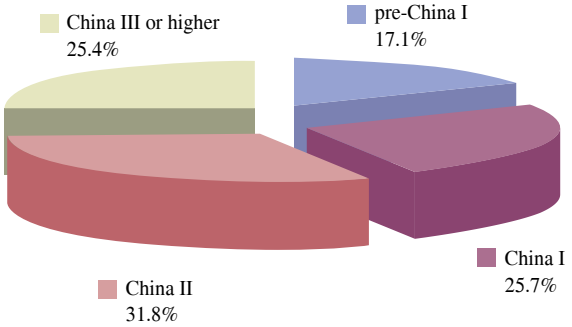


Figure 4. Motor vehicle population by emission standard

2. Vehicle Population Development Trends

2.1 Motor Vehicle Population Development Trend (1980-2009)

From 1980 to 1989, the population of motor vehicles in China increased from 1.783 million to 5.113 million, representing an annual growth rate of 11.1%. From 1990 to 1999, the population of motor vehicles increased from 5.514 million to 14.529 million, an annual growth rate of 10.2%. From 2000 to 2009, the population of motor vehicles increased from 16.089 million to 62.094 million, an annual growth rate of 14.5%.

In 1995, China's motor vehicle population surpassed ten million, reaching 10.4 million by the end of the year. In 2002, China's motor vehicle population surpassed twenty million, reaching 20.532 million by the end of the year. In 2005, China's motor vehicle population surpassed thirty million, reaching 31.597 million by the end of the year. In 2007, China's motor vehicle population surpassed forty million, reaching 43.584 million by the end of the year. In 2008, China's motor vehicle population surpassed fifty million, reaching 50.996 million by the end of the year. In 2009, China's motor vehicle population surpassed sixty million, reaching 62.094 million by the end of the year. Figure 5 shows the motor vehicle population development trend from 1980 to 2009.

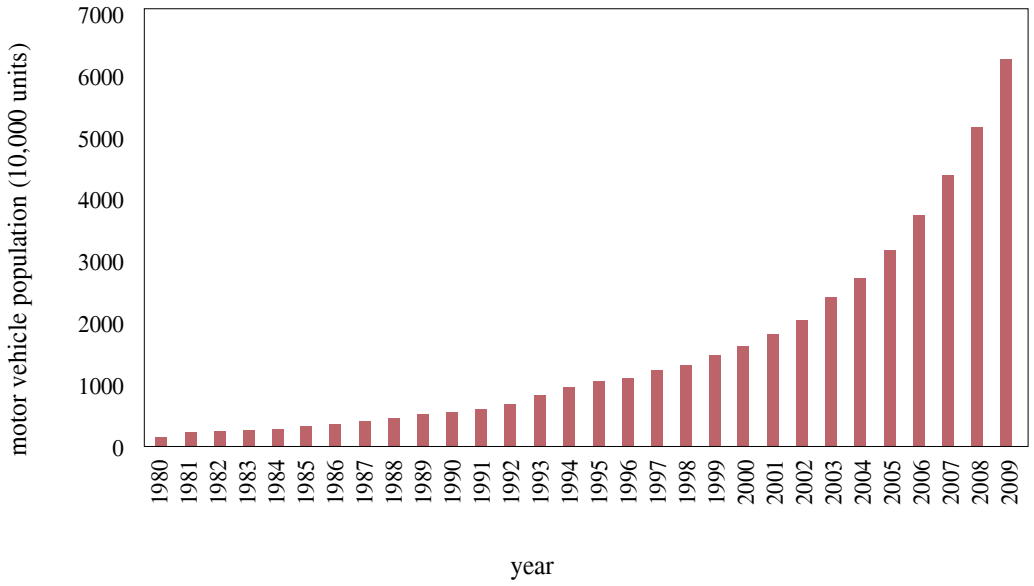


Figure 5. Nationwide motor vehicle population development trend

2.2 Low-Speed Vehicle Population Development Trend (2005-2009)

From 2005 to 2008, the population of low-speed vehicles in China increased from 11.490 million to 14.920 million, an annual increase of 3.0%. However, from 2008 to 2009, the population of low-speed vehicles decreased 10.8%, from 14.920 million to 13.310 million. Figures 6 and 7 show the development trend of low-speed vehicle population and sales from 2005-2009.

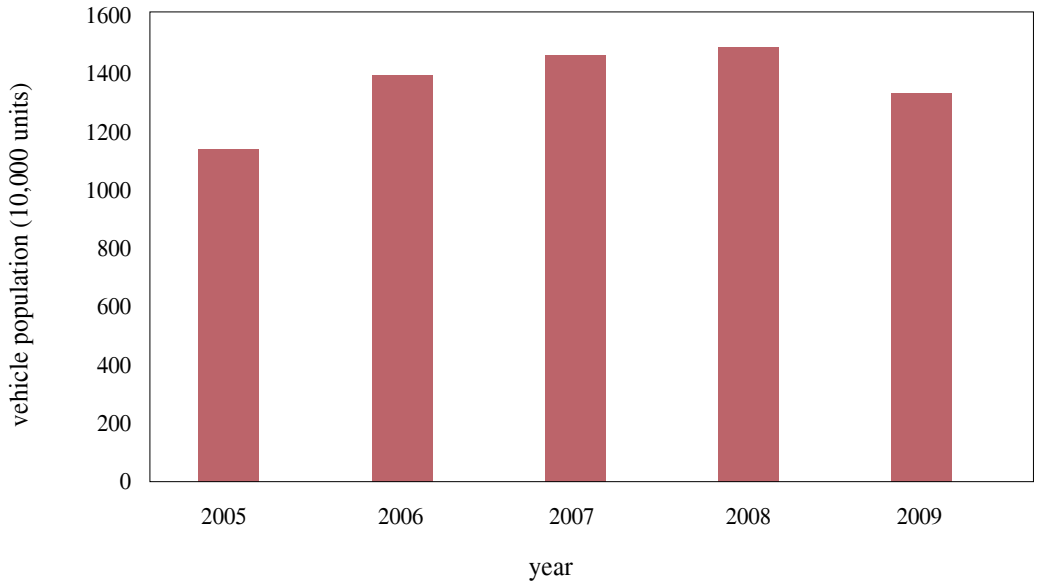


Figure 6. Nationwide low-speed vehicle population development trend

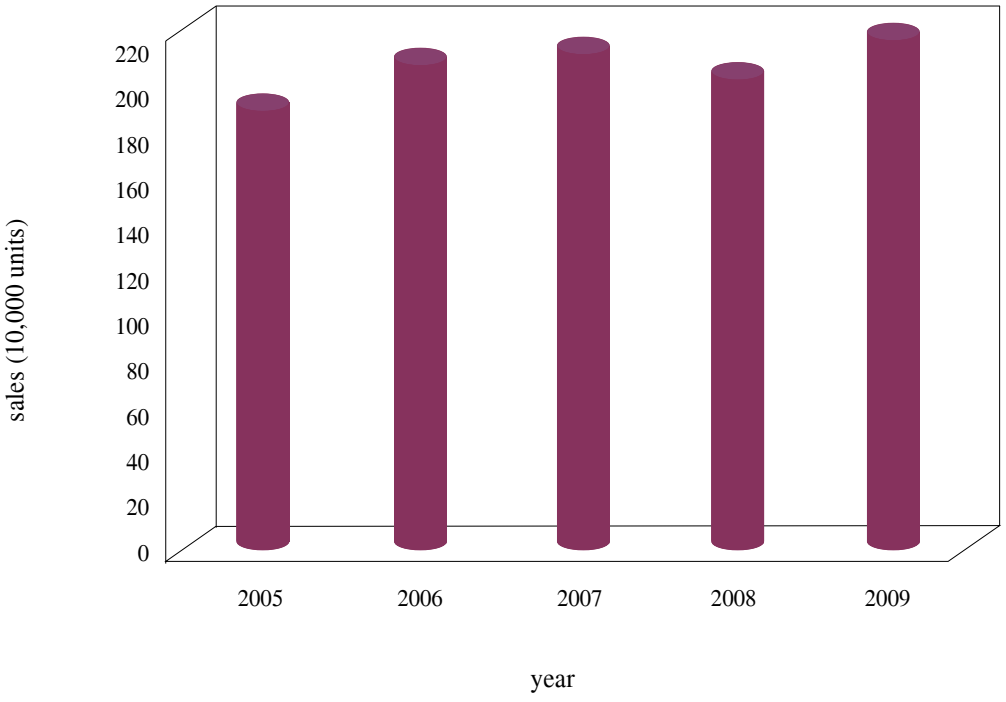


Figure 7. Nationwide low-speed vehicle sales development trend

2.3 Motorcycle Population Development Trend (2000-2009)

From 2000 to 2009, the population of motorcycles in China increased from 37.718 million to 94.531 million, an annual increase of 9.6%. Figure 8 shows China's motorcycle population development trends from 2000 to 2009. Figure 9 shows motorcycle annual population increase, exports and sales from 2001 to 2009.

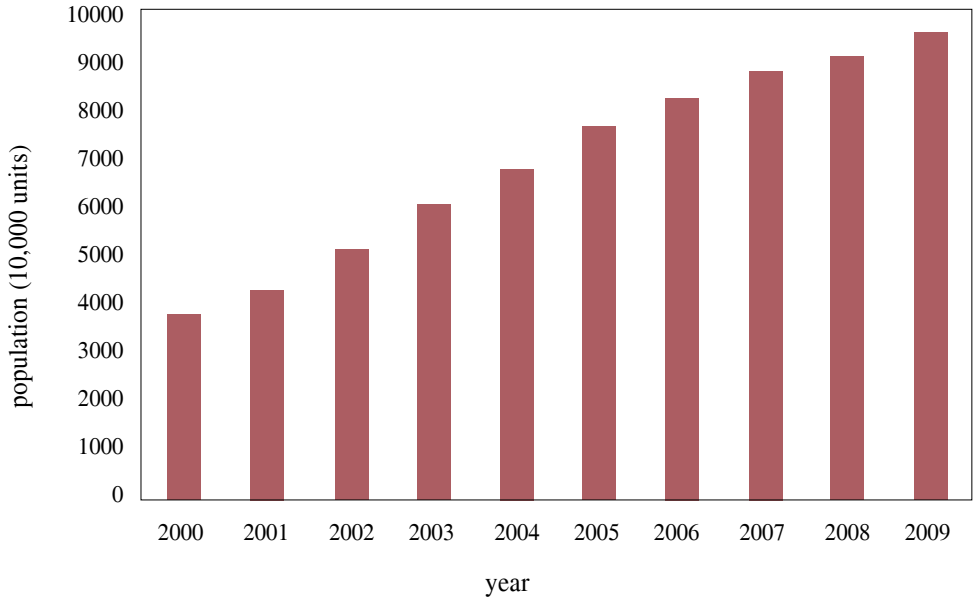


Figure 8. Nationwide motorcycle population development trend

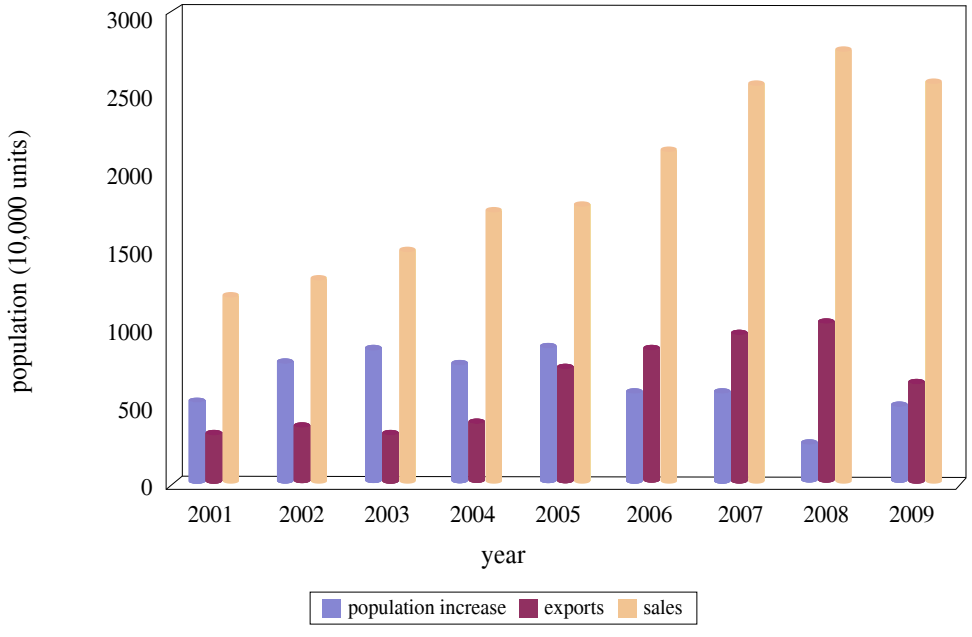


Figure 9. Annual nationwide motorcycle population increase, exports and sales

2.4 Gasoline and Diesel Consumption Development Trends (1980-2008)

From 1980 to 2008, consumption of gasoline and diesel fuel continued to increase, with annual growth rates of 6.7% and 7.8%, respectively. Figure 10 shows the consumption trends of gasoline and diesel fuel from 1980 to 2008.

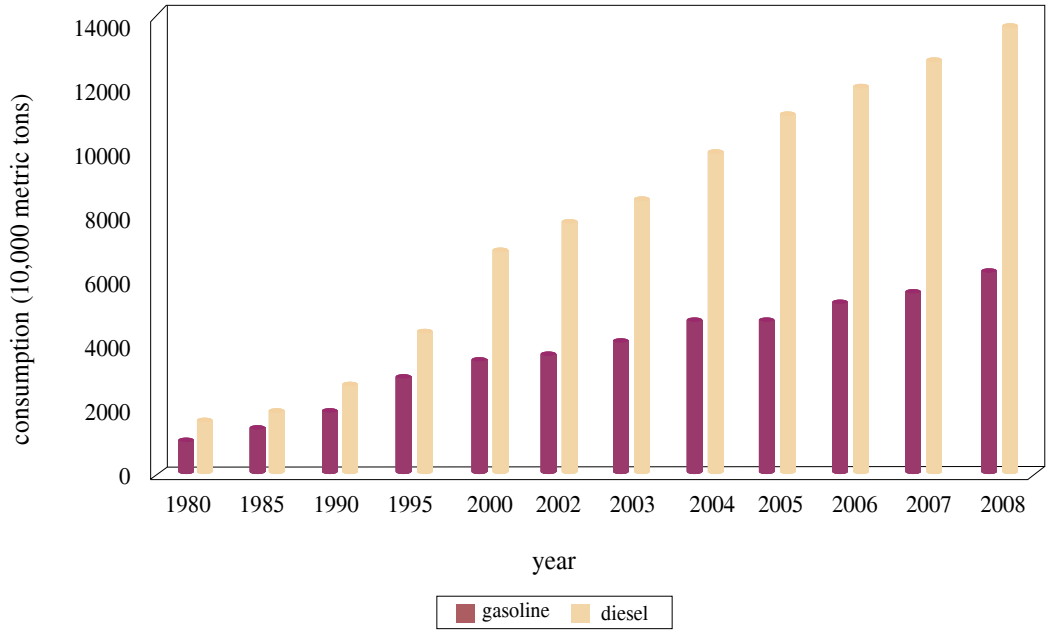


Figure 10. Gasoline and diesel consumption development trends

3. Summary

(1) By the end of 2009, the total population of vehicles in China reached nearly 170 million, up 9.3% from the previous year. The fleet composition was 36.6% motor vehicles, 7.8% low-speed vehicles, and 55.6% motorcycles. As compared with developed countries such as the United States and Japan, China's total motor vehicle population is not large; motorcycles still dominate, accounting for over half of the total vehicle population.

(2) By the end of 2009, the population of motor vehicles reached 62.094 million. By vehicle type, passenger vehicles accounted for 78.0% of vehicles, while goods vehicles accounted for 22.0%. By fuel, gasoline vehicles accounted for 81.3% of motor vehicles, diesel vehicles accounted for 17.7%, and gas vehicles accounted for 1.0%. By emission standard, 17.1% of motor vehicles met pre-China I standards, 25.7% of motor vehicles met the China I standard, 31.8% of motor vehicles met the China II standard, and 25.4% of motor vehicles met the China III or higher standard. In contrast with Europe, nearly 80% of motor vehicles in China are gasoline-powered passenger vehicles, and the fraction of vehicles meeting each emission standard is about the same.

(3) China's growth of vehicle population has been very rapid. From 1980 to 2009, the annual growth rate of motor vehicle population was 12.6%. From 2000 to 2009, the annual growth rate of motorcycle population was 9.6%. In contrast, the population of low-speed vehicles recently has been decreasing, due to national policies encouraging rural residents to purchase light goods vehicles.

Part II: National Vehicle Pollutant Emission Totals

1. Current Situation of Vehicle Pollutant Emissions

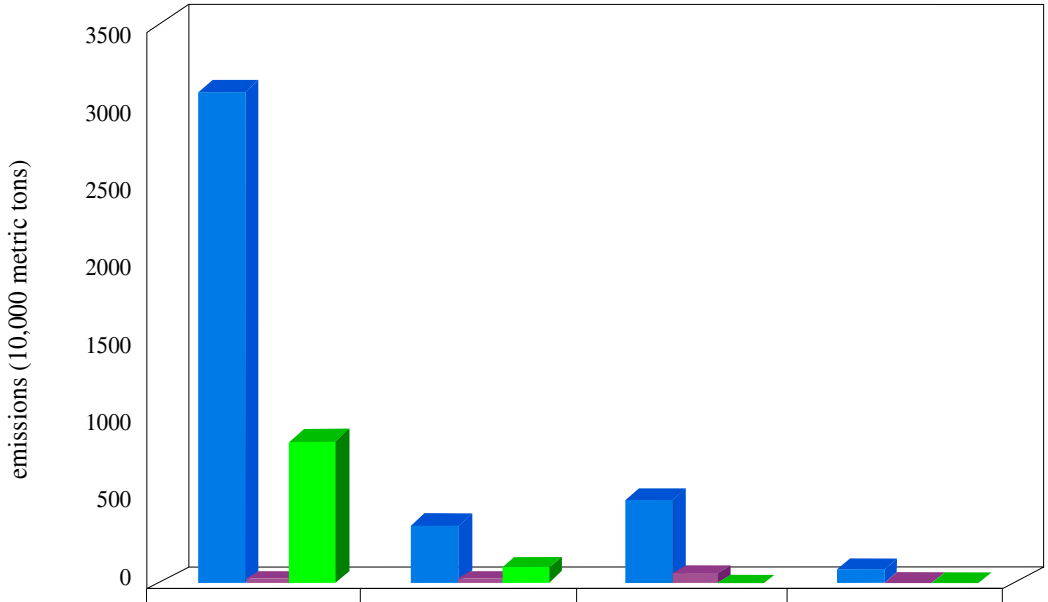
In 2009, nationwide vehicle emissions of carbon monoxide (CO) were 40.188 million metric tons, an increase of 1.7% over 2008. Motor vehicles accounted for 31.107 million metric tons (77.4%), low-speed vehicles accounted for 162,000 metric tons (0.4%), and motorcycles accounted for 8.919 million metric tons (22.2%).

In 2009, nationwide vehicle emissions of hydrocarbons (HC) were 4.822 million metric tons, an increase of 0.9% over 2008. Motor vehicles accounted for 3.589 million metric tons (74.1%), low-speed vehicles accounted for 179,000 metric tons (4.1%), and motorcycles accounted for 1.054 million metric tons (21.8%).

In 2009, nationwide vehicle emissions of oxides of nitrogen (NOx) were 5.833 million metric tons, an increase of 5.4% over 2008. Motor vehicles accounted for 5.298 million metric tons (90.0%), low-speed vehicles accounted for 454,000 metric tons (8.6%), and motorcycles accounted for 81,000 metric tons (1.4%).

In 2009, nationwide vehicle emissions of particulate matter (PM) were 590,000 metric tons, an increase of 0.3% over 2008. Motor vehicles accounted for 561,000 metric tons (94.4%), low-speed vehicles accounted for 29,000 metric tons (5.6%). PM emissions from gasoline and gas motor vehicles and motorcycles were not counted in this analysis.

Figures 11 and 12 show the 2009 total nationwide vehicle pollutant amounts and shares by motor vehicle type.



	carbon monoxide (CO)	hydrocarbons (HC)	oxides of nitrogen (NOx)	particulate matter (PM)
motor vehicles	3110.7	358.9	529.8	56.1
low-speed vehicles	16.2	17.9	45.4	2.9
motorcycles	891.9	105.4	8.1	0.0

Figure 11. Vehicle pollutant amounts and shares by vehicle type

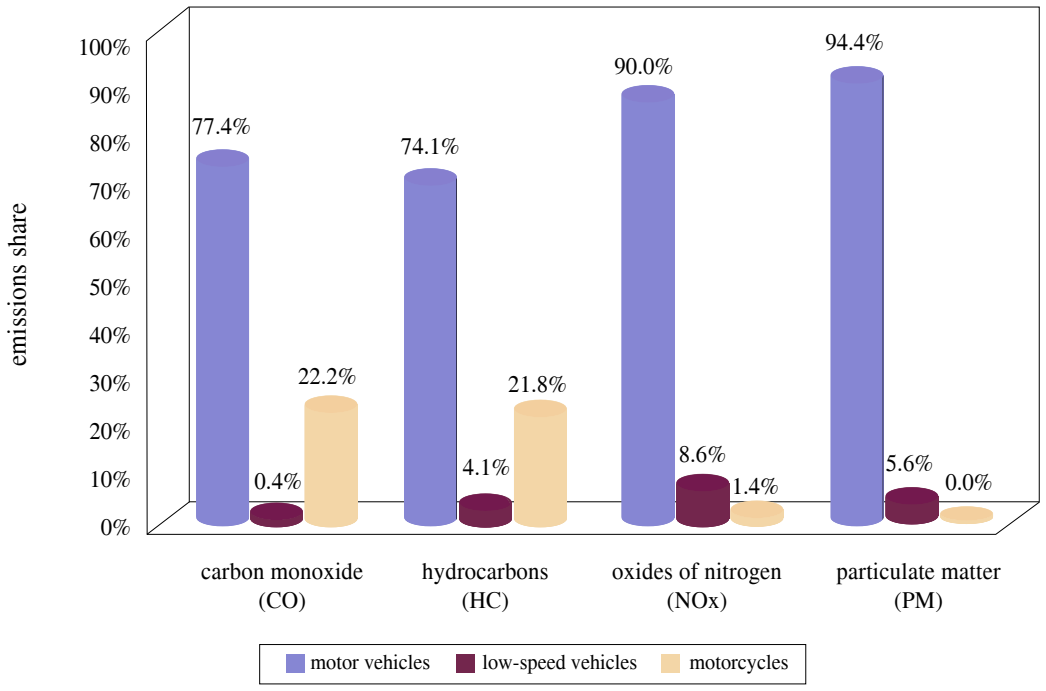


Figure 12. Vehicle pollutant emission shares by type

1.1 Motor Vehicle Emission Amounts by Vehicle Type

(1) Emissions of carbon monoxide (CO)

In 2009, nationwide motor vehicle emissions of carbon monoxide (CO) were 31.107 million metric tons, an increase of 2.3% over 2008. Passenger vehicles emitted 19.317 million metric tons (62.1%), while goods vehicles emitted 11.790 million metric tons (37.9%). Carbon monoxide (CO) emissions from mini, small, medium, and large passenger vehicles were 1.632 million metric tons, 10.745 million metric tons, 1.938 million metric tons, and 5.002 million metric tons, respectively. CO emissions from mini, light, medium, and heavy goods vehicles were 700,000 metric tons, 2.686 million metric tons, 3.178 million metric tons, and 5.226 million metric tons, respectively. Figures 13 and 14 show carbon monoxide (CO) emission totals and shares by motor vehicle type.

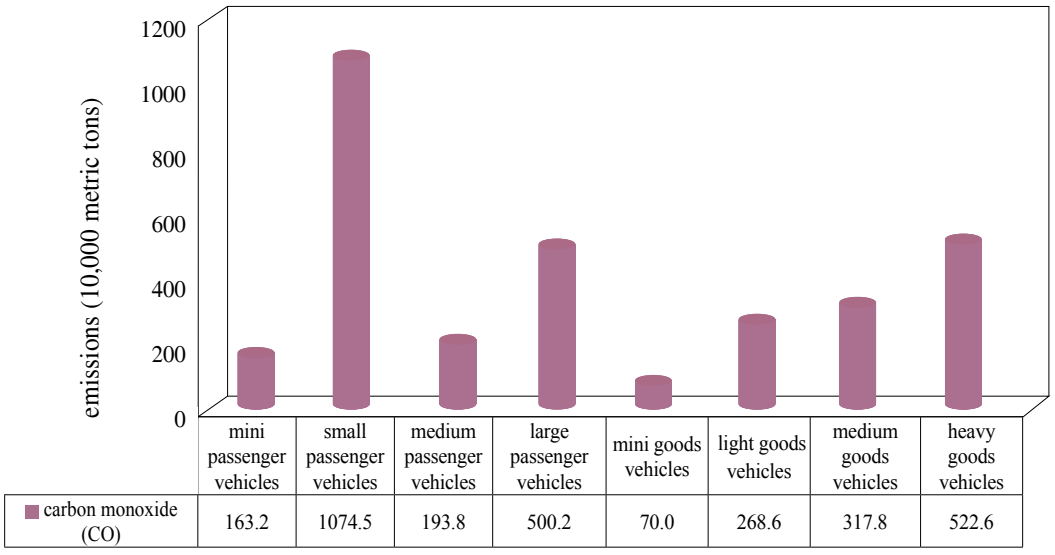


Figure 13. CO emissions by motor vehicle type

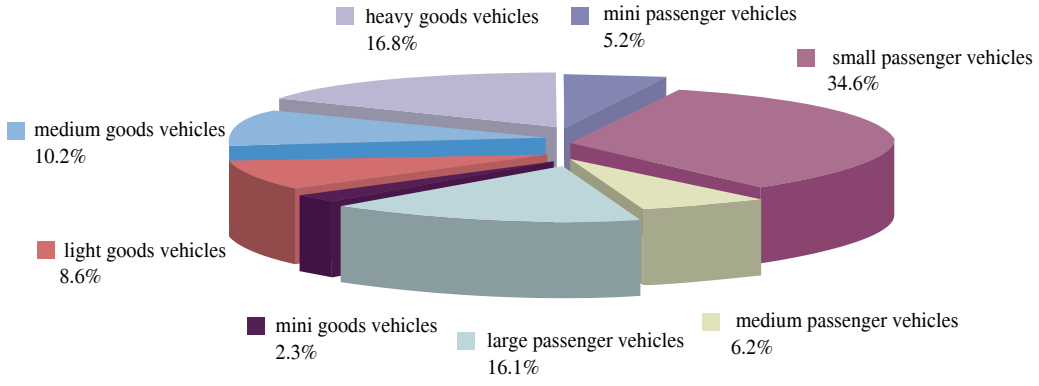
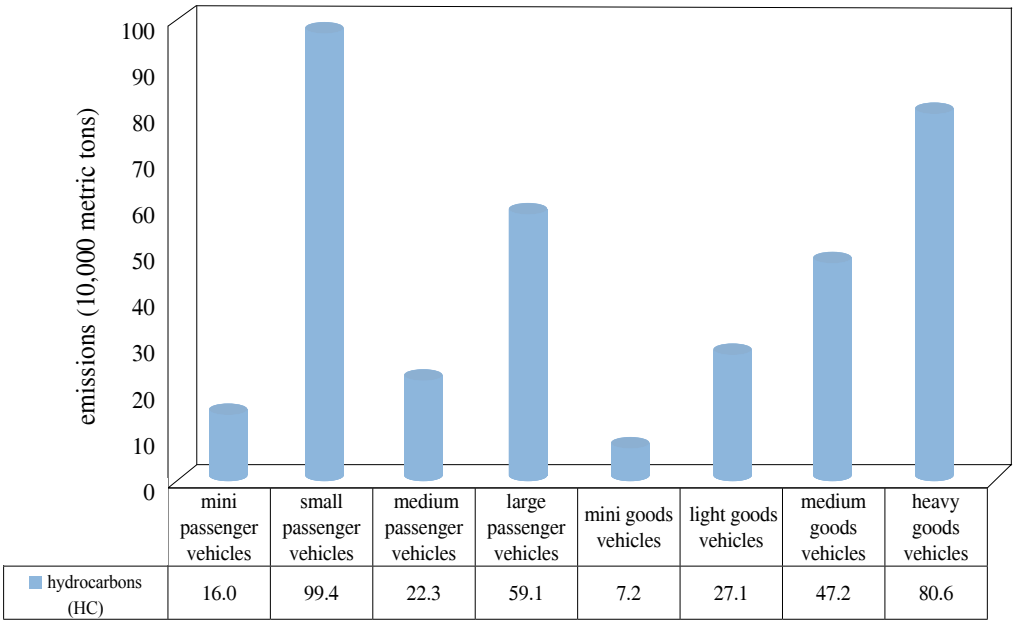


Figure 14. CO emission shares by motor vehicle type

(2) Emissions of hydrocarbons (HC)

In 2009, nationwide motor vehicle emissions of hydrocarbons (HC) were 3.589 million metric tons, an increase of 1.7% over 2008. Passenger vehicles emitted 1.968 million metric tons (54.8%), while goods vehicles emitted 1.621 million metric tons (45.2%).

Hydrocarbon (HC) emissions from mini, small, medium, and large passenger vehicles were 160,000 metric tons, 994,000 metric tons, 223,000 metric tons, and 591,000 metric tons, respectively. HC emissions from mini, light, medium, and heavy goods vehicles were 72,000 metric tons, 271,000 metric tons, 472,000 metric tons, and 806,000 metric tons, respectively. Figure 15 and 16 show hydrocarbon (HC) emissions totals and shares by motor vehicle type.



	mini passenger vehicles	small passenger vehicles	medium passenger vehicles	large passenger vehicles	mini goods vehicles	light goods vehicles	medium goods vehicles	heavy goods vehicles
hydrocarbons (HC)	16.0	99.4	22.3	59.1	7.2	27.1	47.2	80.6

Figure 15. HC emissions by motor vehicle type

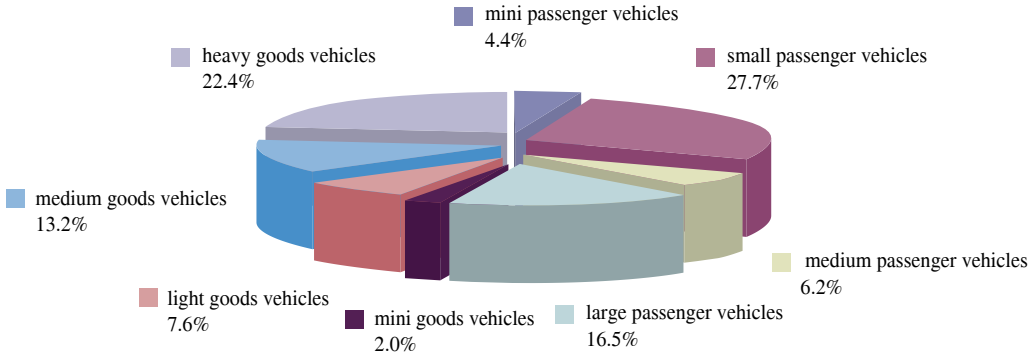


Figure 16. HC emission shares by motor vehicle type

(3) Emissions of oxides of nitrogen (NOx)

In 2009, nationwide motor vehicle emissions of oxides of nitrogen (NOx) were 5.298 million metric tons, an increase of 6.7% over 2008. Passenger vehicles emitted 2.025 million metric tons (38.2%), while goods vehicles emitted 3.273 million metric tons (61.8%).

Oxides of nitrogen (NOx) emissions from mini, small, medium, and large passenger vehicles were 65,000 metric tons, 426,000 metric tons, 264,000 metric tons, and 1.270 million metric tons, respectively. NOx emissions from mini, light, medium, and heavy goods vehicles were 30,000 metric tons, 261,000 metric tons, 935,000 metric tons, and 2.092 million metric tons, respectively. Figures 17 and 18 show oxides of nitrogen (NOx) emission totals and shares by motor vehicle type.

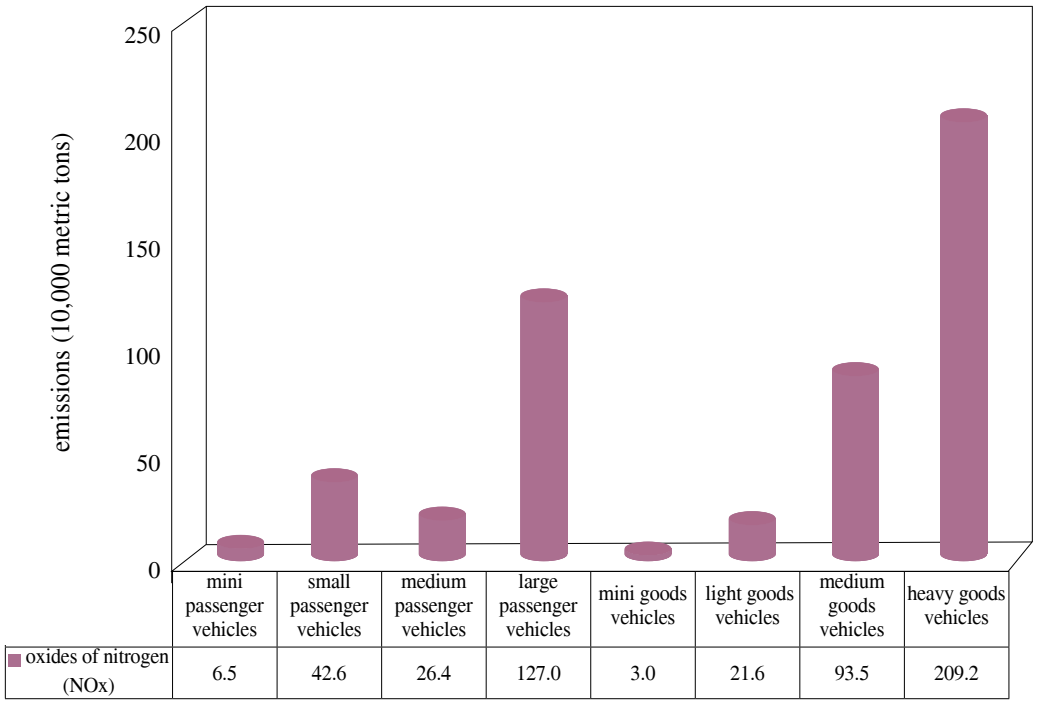


Figure 17. NOx emissions by motor vehicle type

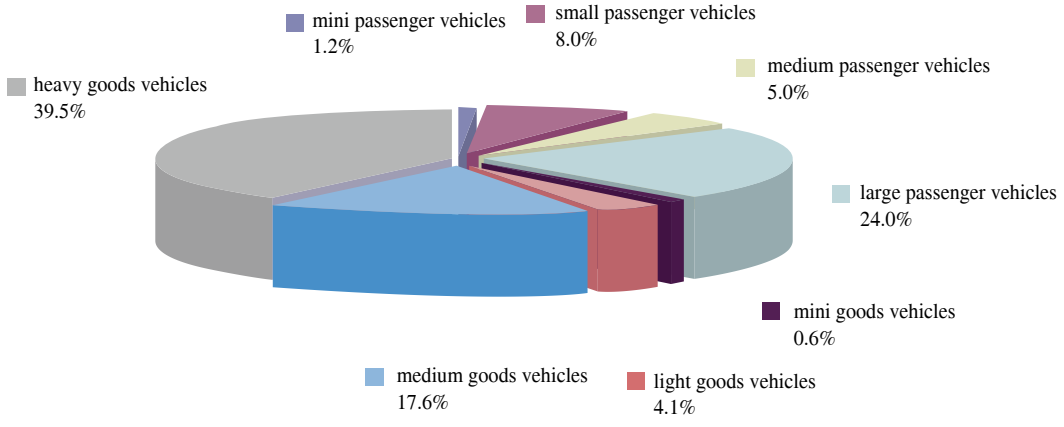


Figure 18. NOx emission shares by motor vehicle type

(4) Emissions of particulate matter (PM)

In 2009, nationwide motor vehicle emissions of particulate matter (PM) were 561,000 metric tons, an increase of 1.1% over 2008. Passenger vehicles emitted 126,000 metric tons, while goods vehicles emitted 435,000 metric tons.

Particulate matter (PM) emissions from mini, small, medium, and large passenger vehicles were 0 metric tons, 6,000 metric tons, 10,000 metric tons, and 110,000 metric tons, respectively. PM emissions from mini, light, medium, and heavy goods vehicles were 1,000 metric tons, 40,000 metric tons, 75,000 metric tons, and 319,000 metric tons, respectively. Figures 19 and 20 show particulate matter (PM) emission totals and shares by motor vehicle type.

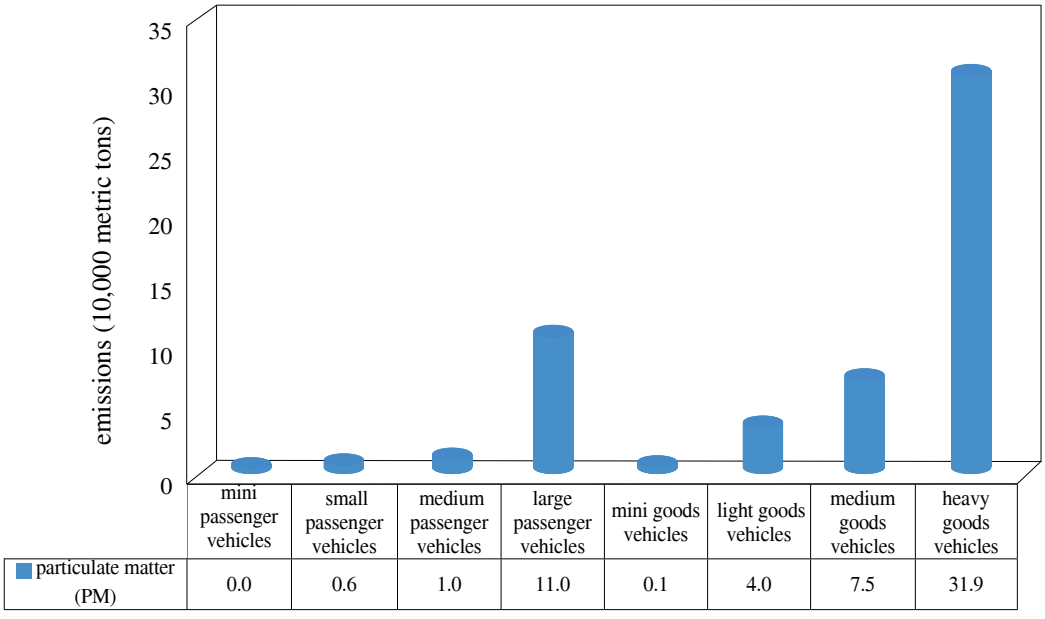


Figure 19. PM emissions by motor vehicle type

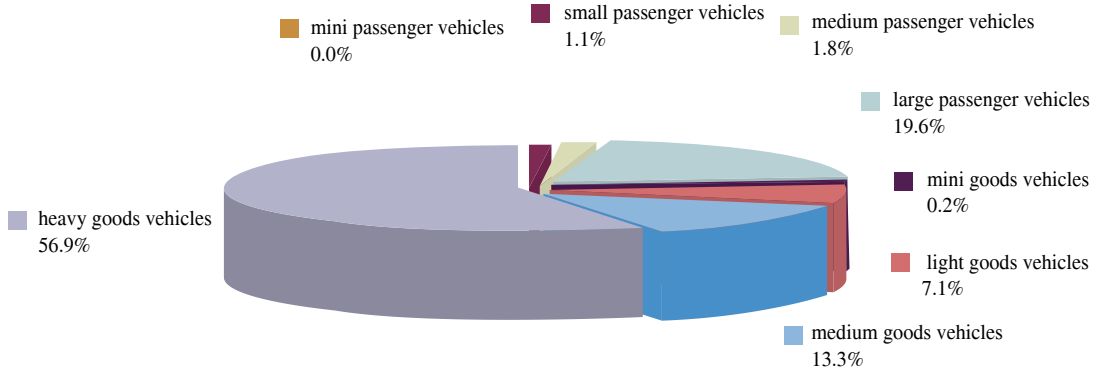


Figure 20. PM emission shares by motor vehicle type

1.2 Motor Vehicle Emission Amounts by Fuel Type

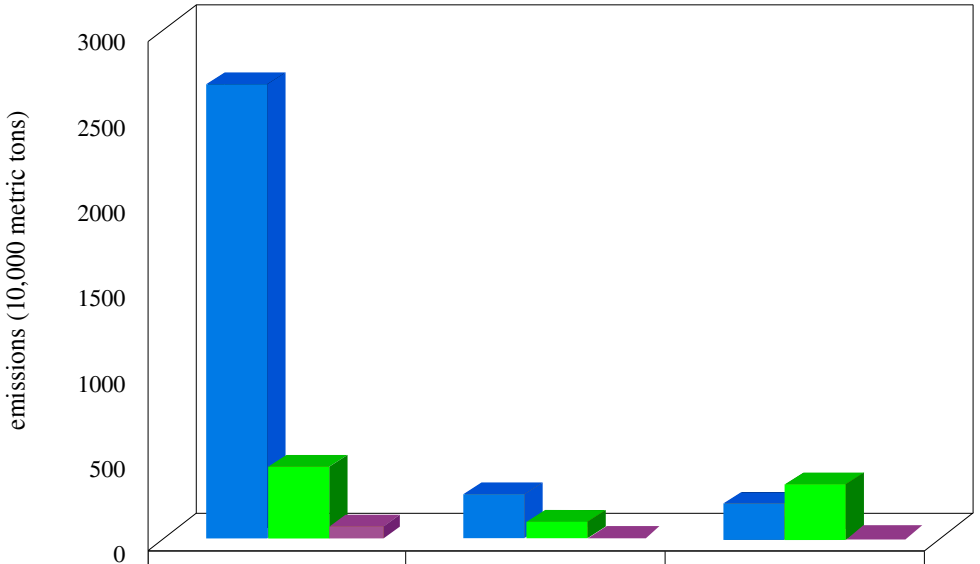
In 2009, nationwide emissions of carbon monoxide (CO) by gasoline vehicles were 26.591 million metric tons (85.5%). Nationwide CO emissions by diesel vehicles were 4.001 million metric tons (12.9%). Nationwide CO emissions by gas vehicles were 515,000 metric tons (1.6%).

In 2009, nationwide emissions of hydrocarbons (HC) by gasoline vehicles were 2.580 million metric tons (71.9%). Nationwide HC emissions by diesel vehicles were 951,000 metric tons (26.5%). Nationwide HC emissions by gas vehicles were 58,000 metric tons (1.6%).

In 2009, nationwide emissions of oxides of nitrogen (NOx) by gasoline vehicles were 2.042 million metric tons (38.6%). Nationwide NOx emissions by diesel vehicles were 3.159 million metric tons (59.6%). Nationwide NOx emissions by gas vehicles were 97,000 metric tons (1.8%).

In 2009, nationwide emissions of particulate matter (PM) by diesel vehicles were 561,000 metric tons.

Figures 21 and 22 show nationwide emissions and shares by fuel type.



	carbon monoxide (CO)	hydrocarbons (HC)	oxides of nitrogen (NOx)
gasoline	2659.1	258.0	204.2
diesel	400.1	95.1	315.9
gas	51.5	5.8	9.7

Figure 21. Motor vehicle pollutant emissions by fuel type

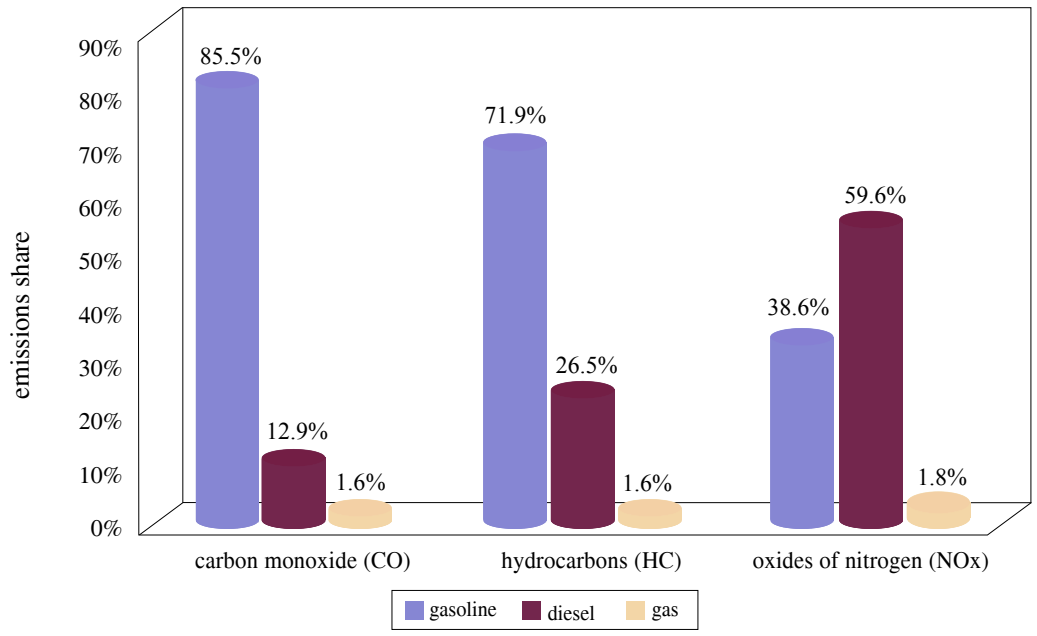


Figure 22. Motor vehicle pollutant emissions share by fuel type

1.3 Motor Vehicle Emission Amounts by Emission Standard

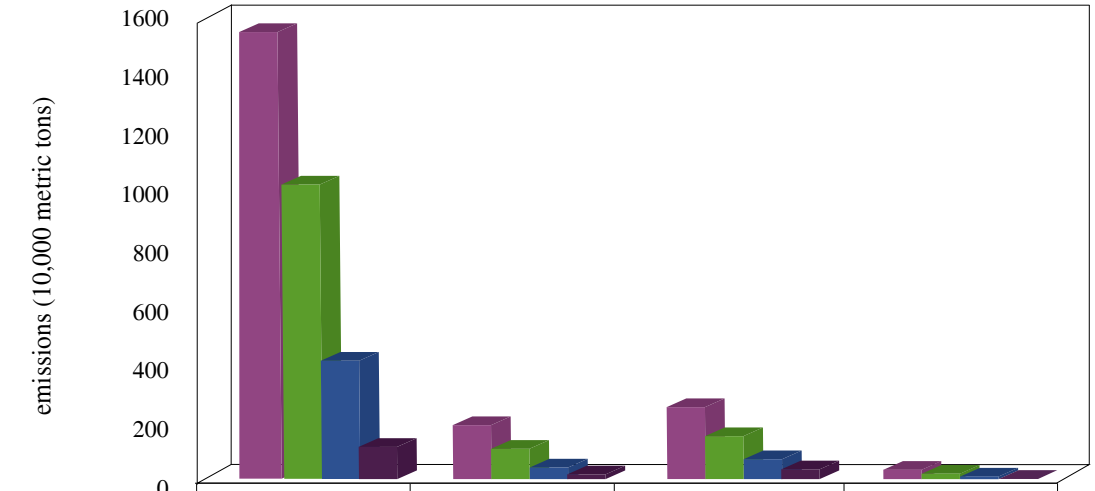
In 2009, nationwide emissions of carbon monoxide by motor vehicles were 31.107 million metric tons, of which 15.558 million metric tons (50.0%) were emitted by vehicles meeting pre-China I standards, 10.265 million metric tons (33.0%) were emitted by vehicles meeting the China I standard, 4.158 million metric tons (13.4%) were emitted by vehicles meeting the China II standard, and 1.126 million metric tons (3.6%) were emitted by vehicles meeting the China III or higher standard.

In 2009, nationwide emissions of hydrocarbons by motor vehicles were 3.589 million metric tons, of which 1.921 million metric tons (53.5%) were emitted by vehicles meeting pre-China I standards, 1.058 million metric tons (29.5%) were emitted by vehicles meeting the China I standard, 437,000 metric tons (12.2%) were emitted by vehicles meeting the China II standard, and 173,000 metric tons (4.8%) were emitted by vehicles meeting the China III or higher standard.

In 2009, nationwide emissions of oxides of nitrogen by motor vehicles were 5.298 million metric tons, of which 2.631 million metric tons (49.6%) were emitted by vehicles meeting pre-China I standards, 1.562 million metric tons (29.5%) were emitted by vehicles meeting the China I standard, 790,000 metric tons (14.9%) were emitted by vehicles meeting the China II standard, and 315,000 metric tons (6.0%) were emitted by vehicles meeting the China III or higher standard.

In 2009, nationwide emissions of particulate matter by motor vehicles were 561,000 metric tons, of which 314,000 metric tons (55.9%) were emitted by vehicles meeting pre-China I standards, 159,000 metric tons (28.4%) were emitted by vehicles meeting the China I standard, 72,000 metric tons (12.8%) were emitted by vehicles meeting the China II standard, and 16,000 metric tons (2.9%) were emitted by vehicles meeting the China III or higher standard.

Figures 23 and 24 show nationwide emissions and shares by emission standard.



	carbon monoxide (CO)	hydrocarbons (HC)	oxides of nitrogen (NOx)	particulate matter (PM)
Pre-China I	1555.8	192.1	263.1	31.4
China I	1026.5	105.8	156.2	15.9
China II	415.8	43.7	79.0	7.2
China III or higher	112.6	17.3	31.5	1.6

Figure 23. Motor vehicle pollutant emissions by emission standard

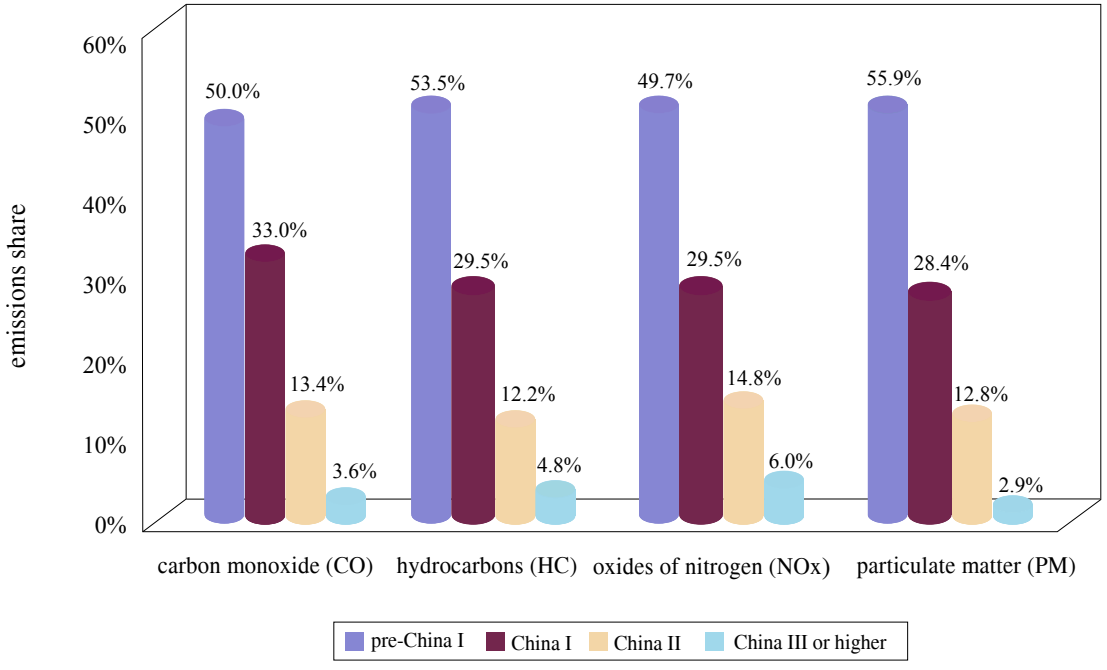


Figure 24. Motor vehicle pollutant emissions share by emission standard

2. Vehicle Pollutant Emission Trends

2.1 Motor Vehicle Pollutant Emission Trends (1980-2009)

From 1980 to 2009, nationwide motor vehicle emissions of carbon monoxide (CO) gradually increased. CO emissions surpassed 10 million metric tons for the first time in 1993, reaching 10.352 million metric tons. CO emissions surpassed 20 million metric tons for the first time in 1998, reaching 20.802 million metric tons. CO emissions surpassed 30 million metric tons for the first time in 2007, reaching 30.341 million metric tons.

From 1980 to 2009, nationwide motor vehicle emissions of hydrocarbons (HC) gradually increased. HC emissions surpassed one million metric tons for the first time in 1991, reaching 1.058 million metric tons. HC emissions surpassed two million metric tons for the first time in 1996, reaching 2.120 million metric tons. HC emissions surpassed three million metric tons for the first time in 2000, reaching 3.002 million metric tons.

From 1980 to 2009, nationwide motor vehicle emissions of oxides of nitrogen (NOx) gradually increased. NOx emissions surpassed one million metric tons for the first time in 1986, reaching 1.019 million metric tons. NOx emissions surpassed two million metric tons for the first time in 1993, reaching 2.196 million metric tons. NOx emissions surpassed three million metric tons for the first time in 1997, reaching 3.027 million metric tons. NOx emissions surpassed four million metric tons for the first time in 2001, reaching 4.102 million metric tons. NOx emissions surpassed five million metric tons for the first time in 2009, reaching 5.298 million metric tons.

From 1980 to 2009, nationwide motor vehicle emissions of particulate matter (PM) exhibited an overall upward trend, although annual declines were seen in 1996 and 2003. PM emissions surpassed 100,000 metric tons for the first time in 1982, reaching 104,000 metric tons. PM emissions surpassed 200,000 metric tons for the first time in 1989, reaching 216,000 metric tons. PM emissions surpassed 300,000 metric tons for the first time in 1993, reaching 322,000 metric tons. PM emissions surpassed 400,000 metric tons for the first time in 1997, reaching 408,000 metric tons. PM emissions surpassed 500,000 metric tons for the first time in 2000, reaching 506,000 metric tons.

Figures 25 and 26 show national motor vehicle emission trends by pollutant.

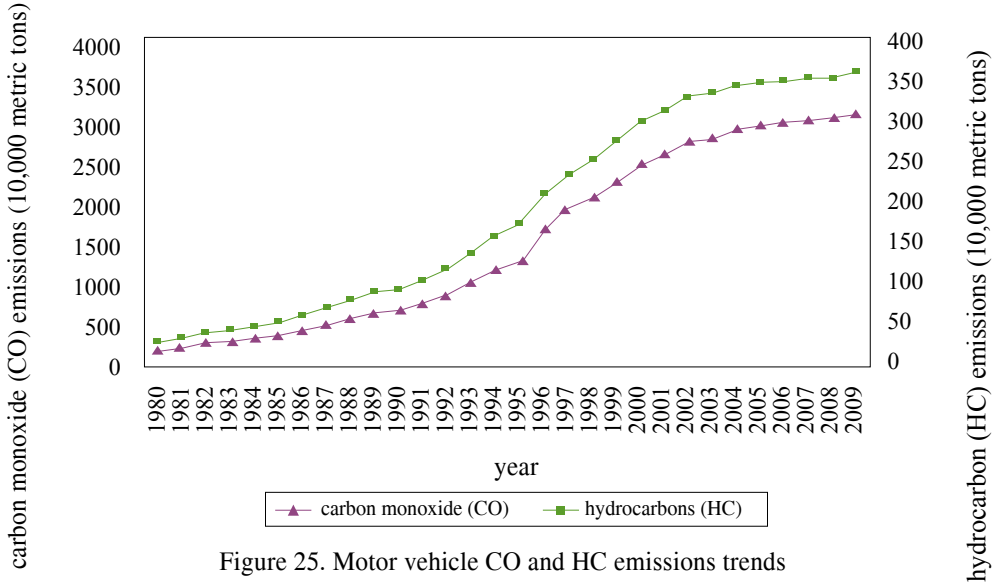


Figure 25. Motor vehicle CO and HC emissions trends

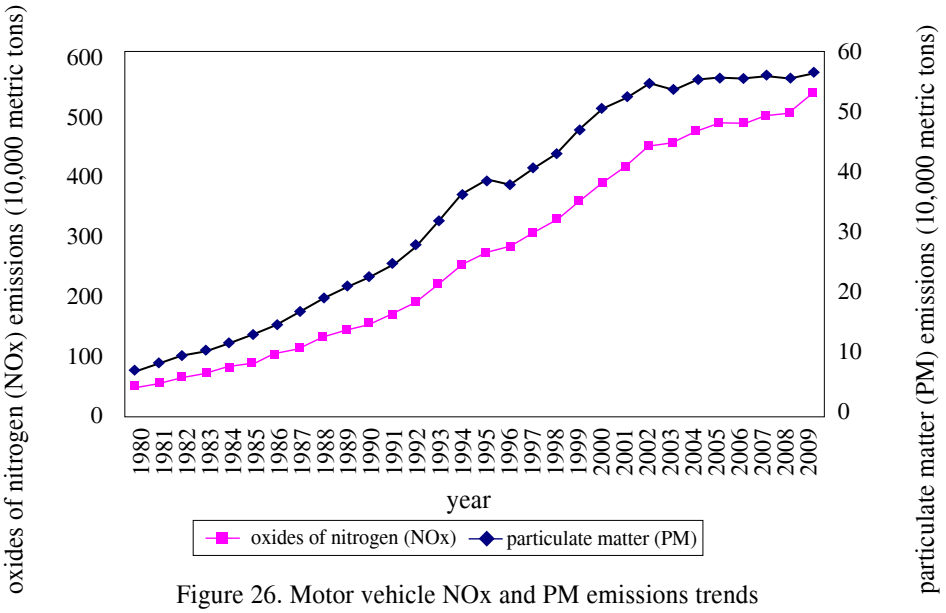


Figure 26. Motor vehicle NOx and PM emissions trends

2.2 Low-speed Vehicle Pollutant Emission Trends (2005-2009)

From 2005 to 2008, nationwide emissions of CO, HC, NOx, and PM from low-speed vehicles gradually increased. Emissions peaked in 2008, then decreased from 2008 to 2009. This decrease was the impact of national policies to switch from low-speed vehicles to goods vehicles. In 2009, nationwide emissions from low-speed vehicles of CO, HC, NOx, and PM were 162,000 metric tons, 179,000 metric tons, 454,000 metric tons, and 29,000 metric tons, respectively.

Figure 27 shows nationwide trends of pollutant emissions from low-speed vehicles.

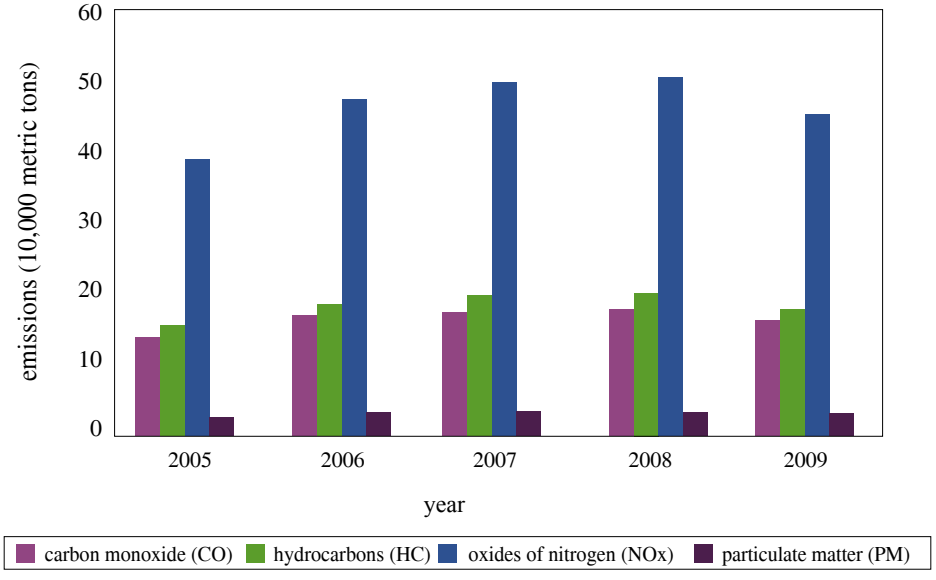


Figure 27. Low-speed vehicle pollutant emissions trends

2.3 Motorcycle Pollutant Emission Trends (2000-2009)

From 2000 to 2007, nationwide motorcycle emissions of CO gradually increased, peaked in 2007, then began to decrease from 2007 to 2009. From 2000 to 2009, nationwide motorcycle emissions of HC and NOx gradually increased. In 2009, nationwide motorcycle emissions of CO, HC, and NOx were 8.919 million metric tons, 1.054 million metric tons, and 81,000 metric tons, respectively. Figure 28 shows nationwide motorcycle pollutant emissions trends.

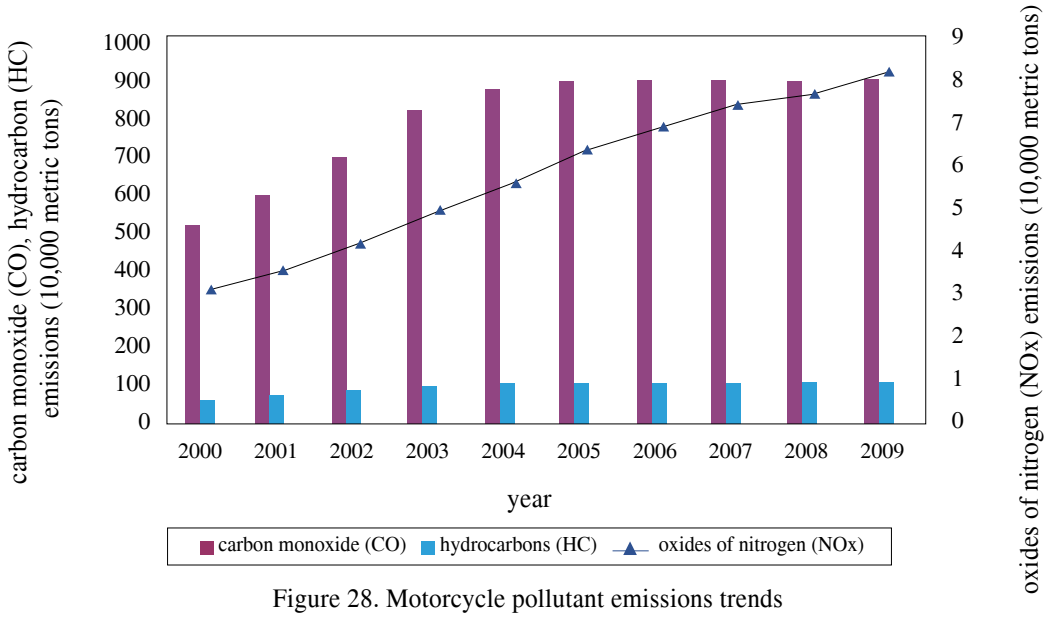


Figure 28. Motorcycle pollutant emissions trends

3. Summary

(1) In 2009, vehicles in China emitted 40.188 million metric tons of carbon monoxide (CO), 4.822 million metric tons of hydrocarbons (HC), 5.833 million metric tons of oxides of nitrogen (NOx), and 590,000 metric tons of particulate matter (PM). Among all vehicles, motor vehicles were the dominant contributor, accounting for over 70% of total CO and HC emissions and over 90% of NOx and PM emissions.

(2) According to vehicle type, passenger vehicle emissions of CO and HC were clearly larger than emissions from goods vehicles. The largest contribution came from medium and small passenger vehicles. In contrast, emissions of NOx and PM were much larger from goods vehicles than from passenger vehicles. The largest contributors were medium and heavy goods vehicles.

(3) According to fuel type, gasoline vehicles emitted much greater CO and HC emissions than diesel vehicles, with total emissions over 70% of the total. In contrast, diesel vehicles emitted over 90% of NOx and PM.

(4) According to emission standard, the 17.1% of vehicle meeting pre-China I emission standards emitted over 50% of total pollutant emissions. In contrast, the 25.4% of vehicle meeting the China III or higher emission standard emitted less that 6% of total emissions. Therefore, the impact on emission reduction of progressively stricter emission standard is very clear.

(5) From 1980 to 2009, national emissions from motor vehicles have shown an increasing trend. From 1980 to 2000, total emissions grew in accordance with total vehicle population. After 2000, however, the increase in pollution emissions began to slow, owing to the continued introduction of strict vehicle emission standards.

1. Laws, Regulations and Standards

The "Law of the People's Republic of China on the Prevention and Control of Atmospheric Pollution" (simplified as "Air Pollution Law") is the principal legal basis for developing motor vehicle environmental compliance management in China.The law was adopted by the Standing Committee of the National People's Congress in 1987 and was revised successively in 1995 and 2000.

Regarding the new production of vehicles, the "Air Pollution Law" prescribes that "Motor-driven vehicles and vessels shall not be permitted to discharge atmospheric pollutants in excess of the prescribed discharge standards. No unit or individual may manufacture, sell or import motor-driven vehicles and vessels that discharge atmospheric pollutants in excess of the prescribed discharge standards." The penalty of violating the law is that any unit or individual which "manufactures, sells or imports motor-driven vehicles and vessels that discharge atmospheric pollutants in excess of the prescribed standards shall be ordered by the department exercising the power of supervision and management according to the law to stop the illegal act; illegal gains, if any, will be confiscated, and a fine may be imposed equal to less than one time the illegal gains. The motor-driven vehicles and vessels that cannot meet the prescribed standards for pollutants discharge shall be confiscated and destroyed."

Since the first set of emission standards for new production motor vehicles were issued in 1983, Chinese emission standards have developed rapidly. By the end of 2009, China has almost established a complete emission standards system for new production motor vehicles, as shown in table 1.

Table 1. Emission Standards System for New Production Motor Vehicles

Classification			Driving cycle test [1]	Evaporative emissions	Crankcase emissions	Gasoline idle	Full-load smoke	Free acceleration smoke
Motor vehicle	Light (small)	Gasoline	●	●	●	●		
		Gas	●		●	●		
		Diesel	●				●	●
	Heavy (large)	Gasoline	●	●	●	●		
		Gas	●		●	●		
		Diesel	●				●	●
Motorcycle	Motorcycle		●	●	●	●		● [2]
	Moped		●	●	●	●		● [2]
Three-wheeled and low-speed vehicles			●					●

Note: 1. Exhaust emission control for new production vehicles or engines (including CO, HC, NOx and PM);
2. Snap-acceleration for motorcycles.

China implemented the China I emission standard nationwide in 2000, then implemented China II and China III emission standards in 2004 and 2007, respectively. In addition, Beijing and Shanghai have implemented China IV emission standard in advance. Along with the improvement of emission standards, pollutant emissions from individual vehicles are gradually reduced. For example, for a Class I light gasoline vehicle, from China I to China III, carbon monoxide (CO) emissions dropped 44%, hydrocarbon (HC) emissions dropped 70%, and oxides of nitrogen (NOx) emissions dropped 70%, as shown in Figure 29.

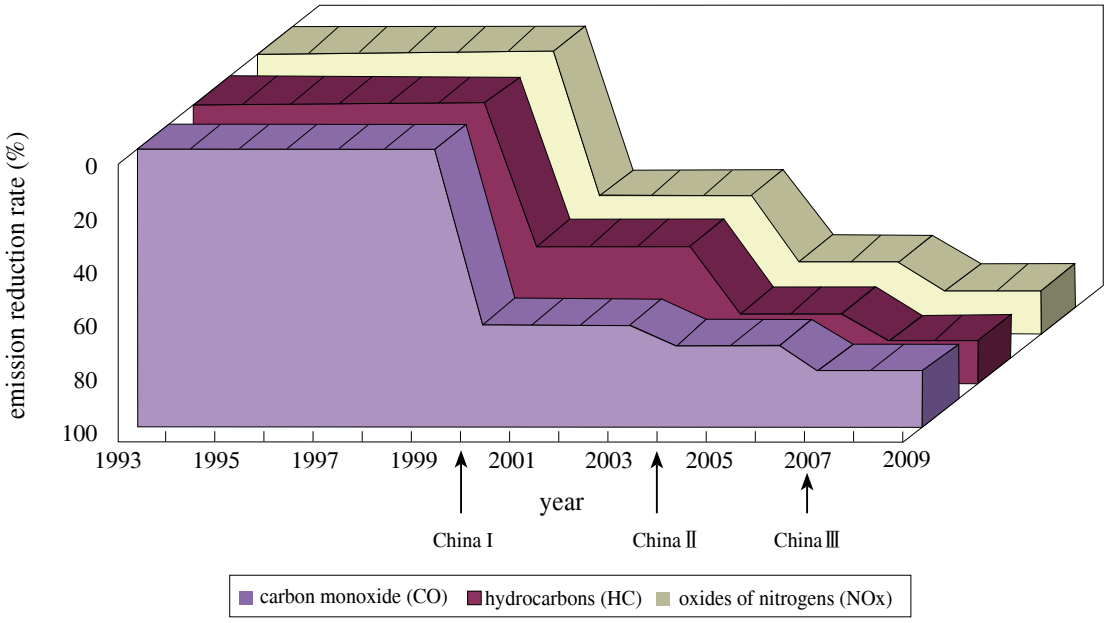


Figure 29. Class I light gasoline vehicle emission control stages

2. Environmental Compliance Management for New Production Motor Vehicles

China's environmental compliance management for new production motor vehicles was mainly developed through formulating and implementing national motor vehicle emission standards. The purpose is to ensure that vehicles can steadily achieve the emission standards by strengthening environmental supervision from designing, type finalizing, production and sales. Environmental compliance management for new motor vehicles is an important method for prevention and control of motor vehicle pollutants.

2.1 System of Environmental Compliance Type Approval

According to the requirements of national motor vehicle emission standards, motor vehicle type approval is the environmental compliance management institution for evaluating compliance capability of newly designed motor vehicles. The manufacturer should submit technical data of the newly designed vehicle to related environmental protection departments, and the environmental protection departments will issue environmental compliance type approval certificates and compliance vehicle type lists after the verification process.

By the end of 2009, a total of 127,468 motor vehicle models (including engine models) have passed type approval verification and have met the requirements of national motor vehicle emission standards. According to the requirement of China III emission standards, the issuance of type approval certificates started from July of 2007. A total of 53,108 certificates have been issued by 2009. Figure 30 shows type approval statistics data of different emission standards. Figure 31 shows type approval data for each calendar year.

Beginning in 2002, in order to improve efficiency and standardize type approvals, all type approvals and review were switched to a paperless network system. Lists of vehicle types passing environmental type approval and related information are issued monthly. Simultaneously, the Vehicle Environmental Protection Website has created a search function for vehicle environmental standards information, in order to make this information available to the general public.

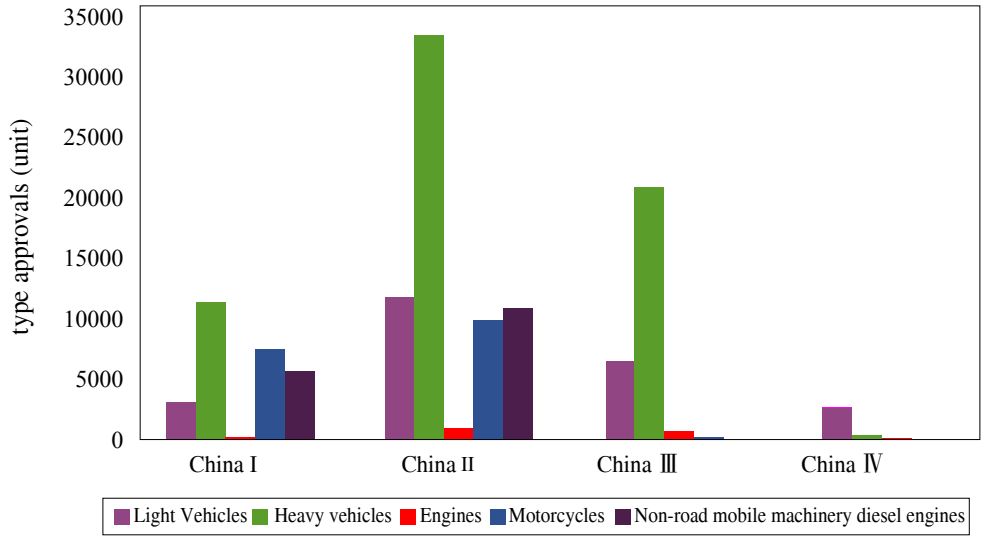


Figure 30. Type approval statistical data by emission standard

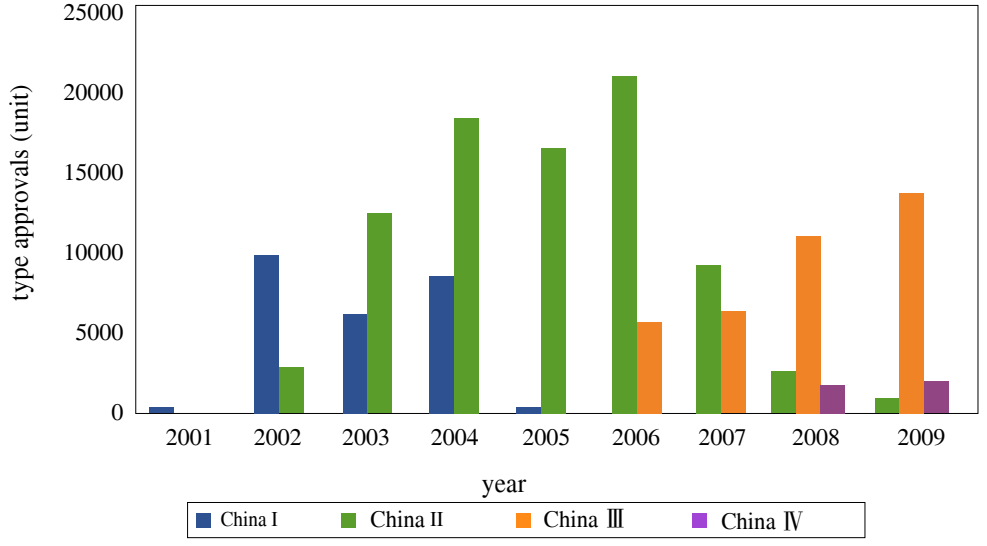


Figure 31. Type approval data of each calendar year

2.2 Conformity of Production (COP) Supervision

According to the requirements of national motor vehicle emission standards, motor vehicle COP supervision is the environmental management mechanism for evaluating emission compliance of mass produced and for sale motor vehicles. For ensuring motor vehicles on the market are in compliance with relevant emission standards, environmental protection departments conduct random supervision tests on some specific potential non-compliant enterprises and vehicle models based on COP assurance plans submitted by the manufacturers and the executive progress of the plans.

In 2009, a total of 675 motor vehicle manufacturers submitted 6,733 COP assurance plans to environmental protection departments; 364 manufacturers submitted quarterly COP reports; and, 512 manufacturers submitted annual COP reports.

(Note: the term “light vehicle” and “heavy vehicle” are classified based on motor vehicle emission standards in this chapter.)

Box 1: Incentive Policies for Vehicle Environmental Protection

(1) Reduced vehicle consumption tax for low pollution motor vehicles

In order to protect the environment, promote low pollution vehicles and improve vehicle technology development, the Ministry of Finance and State Administration of Taxation issued the "Notice of Reduced Consumption Tax for Low Pollution Cars" (Ministry of Finance Document No. [2000]26) in 2000, which prescribed to reduce by 30% the consumption tax for small passenger cars and SUVs which achieved the China II emission limits in advance.

(2) Reduced purchase tax for low displacement motor vehicles

The Ministry of Finance and State Administration of Taxation issued the "Notice of the Ministry of Finance and the State Administration of Taxation on the Reduced Vehicle Purchase Tax on Passenger Cars with 1.6L or Lower Displacement" in January of 2009, which prescribed that the vehicle purchase tax on the purchase of passenger cars with 1.6L or lower displacement shall be levied at the reduced rate of 5% temporarily from January 20 to December 31, 2009.

(3) Reduced vehicle consumption tax for small displacement motor vehicles

In 2008, the State Council issued the "Notice of the State Council on Further Strengthening Fuel and Electricity Conservation Work," (State Council Document No. [2008]23) which encouraged the use of environmental protection vehicles with lower fuel consumption and clean energy vehicles. Meanwhile, it reduced the tax rate on low displacement vehicles and increased the tax rate on high displacement vehicles. The Ministry of Finance and State Administration of Taxation issued the "Notice of Adjusting and Electricity Conservation Work" (State Council Document No. [2008]23), and the "Notice of Adjusting Consumption Tax on Passenger Cars" (Ministry of Finance Document No. [2008]105) which decreased the consumption tax rate on passenger cars with lower than 1.0L displacement and increased the tax rate on passenger cars with displacement higher than 3.0L.

Box 2: Advanced Implemention of National Vehicle Emission Standards

(1) Beijing

Under the approval of the State Council, Beijing began to implement China II vehicle emission standards in advance from January 1, 2003, began to implement China III vehicle emission standards in advance from December 30, 2005, and began to implement China IV vehicle emission standards in advance from March 1, 2008.

(2) Shanghai

Under the approval of the State Council, Shanghai began to implement China II vehicle emission standards in advance from March 1, 2003, and began to implement China IV vehicle emission standards in advance from November 11, 2009.

(3) Guangzhou

Under the approval of the State Council, Guangzhou began to implement China III vehicle emission standards in advance from September 1, 2006.

Part IV: National Environmental Management of In-use Vehicles

1. Laws, Regulations and Standards

Through the end of 2009, China's in-use vehicle emission standard system has been basically established, as shown in Table 2:

Table 2. In-use vehicles emission standard system

Vehicle type		Standard name	Pollutant(s) controlled	Measurement method	Measured vehicle type
Motor vehicle	S.I.E.	Limits and measurement methods for exhaust pollutant from vehicle equipped ignition engine under two-speed idle conditions and simple driving mode conditions.	CO, HC, NO_X	Two-speed idle, BASM	In-use SI vehicles, including light and heavy vehicles
	C.I.E.	Limits and measurement methods for exhaust smoke from C.I.E. (Compression Ignition Engine) and vehicle equipped with C.I.E.	Exhaust smoke	Free acceleration, Loading deceleration	In-use CI vehicles, including light and heavy vehicles
Motorcycles and mopeds		Limits and measurement methods for exhaust emissions from motorcycles and mopeds at idle speed.	CO, HC	Idle speed, BASM	In-use motorcycles and mopeds
		Limits and measurement methods for exhaust smoke emissions from motorcycles and mopeds.	Exhaust smoke	Hard acceleration method	In-use motorcycles and mopeds
Low-speed and three-wheeled vehicles		Limits and measurement methods for smoke at free acceleration from agricultural vehicles.	Exhaust smoke	Free acceleration method	In-use low-speed and three-wheeled vehicles

2. Environmental Management of In-use Vehicles

Environmental management of in-use vehicles is organized and implemented according to the law by environmental protection administrative departments at various levels. Supervision and management systems have already been established for commissioning vehicle periodic inspection centers, vehicle environmental inspection, vehicle environmental inspection compliance labeling, etc.

2.1 System for Commissioning Vehicle Periodic Inspection Centers

In accordance with regulations relevant to China's "Air Pollution Law," the Ministry of Environmental Protection issued the "Notice on 'Regulations for Management of Vehicle Environmental Inspection Centers'" on December 10, 2009 (Ministry of Environmental Protection Document No. [2009]145). The notice further standardizes the management of vehicle environmental inspection centers. On May 13th, 2010, the Ministry of Environmental Protection issued the "Guidance on Establishment of Vehicle Environmental Inspection Centers Development Plan" (Ministry of Environmental Protection Document No. [2010]65), which provides guidance to each area for establishing a development plan for vehicle environmental inspection centers.

2.2 System for Vehicle Environmental Inspections

In accordance with relevant regulations of the "Air Pollution Law," China has established a basic system of both regular vehicle environmental inspections and random testing of parked cars. In 2009, 99.09 million vehicles nationwide participated in regular inspections, amounting to approximately 58% of the entire vehicle fleet. Some cities have implemented random environmental testing of parked cars and vehicles operating on the road.

2.3 Management System of Vehicle Environmental Compliance Labeling

On July 22, 2009, the Ministry of Environmental Protection issued the "Notice about Issuing 'Management Regulations on Vehicle Environmental Inspection Compliance Labeling" (Ministry of Environmental Protection Document No. [2009]87), standardizing the design, specifications, categorization standards, issuing procedures, and information reporting requirements for vehicle environmental inspection compliance labels. The management regulations came into effect on October 1, 2009. Through the end of 2009, 9.90 million vehicles nationwide have been issued with environmental compliance labels, comprising 13% of the entire vehicle fleet.

Box 3: "Yellow-Label Vehicles" Replacement Policy

"Yellow-label vehicles" refer to gasoline vehicles whose emissions do not meet the China I standard and diesel vehicles, motorcycles, three-wheeled vehicles, and low-speed vehicles whose emissions do not meet the China III standard. The concept of "yellow-label vehicles" was first established in Beijing in 1999, when the Beijing Environmental Protection Bureau affixed yellow labels to vehicles not meeting the China I emission standard, calling these vehicles "yellow-label vehicles." In June 2009, the State Council General Office forwarded a proposal from the National Development and Reform Commission and other Ministries titled "Implementation Proposal to Promote Expansion of Domestic Demand and Promote Replacement of Vehicles and Home Electronics" (State Council Document No. [2009]44). The proposal recommends using fiscal subsidies to encourage "yellow-label vehicles" to be replaced with new vehicles. Subsequently, ten Ministries and Commissions, including the Ministry of Finance, Ministry of Commerce, Ministry of Environmental Protection, and others, jointly issued the "Implementation Methods for Vehicle Scrappage and Replacement" (Ministry of Finance Document No. [2009]333). The regulation clearly describes the scope, standards, scrappage and update subsidies application, examination, and issuance guidelines for the "yellow-label vehicle" scrappage and replacement program. The Ministry of Environmental Protection is given responsibility to identify and inspect "yellow-label vehicles," and implement environmental supervision of scrapped vehicles.

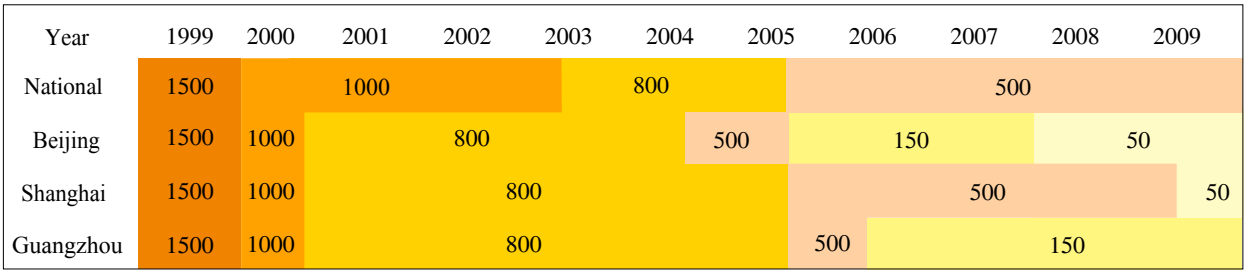
1. Laws, Regulations and Standards

China's current "Air Pollution Law" includes the following provisions on vehicle fuels: "The State will promote and support the production and use of superior quality fuels, and will adopt measures to reduce toxic substances in the fuel that cause pollution of the atmosphere and environment. Work units and individuals should, in according with the regulatory timeline of the State Council, stop producing, importing, and selling leaded gasoline."

Vehicle emission after-treatment devices are a key component of guaranteeing that vehicles can meet relevant emission standards. Lead or overly high amounts of sulfur in fuel will cause after-treatment devices to fail. Therefore, improving the quality of fuel is a key indicator. Through the end of 2009, China had taken two large actions regarding environmental indicators of fuel. First, China implemented unleaded gasoline on July 1st, 2000. Second, China has made relatively large progress on reducing sulfur in fuel.

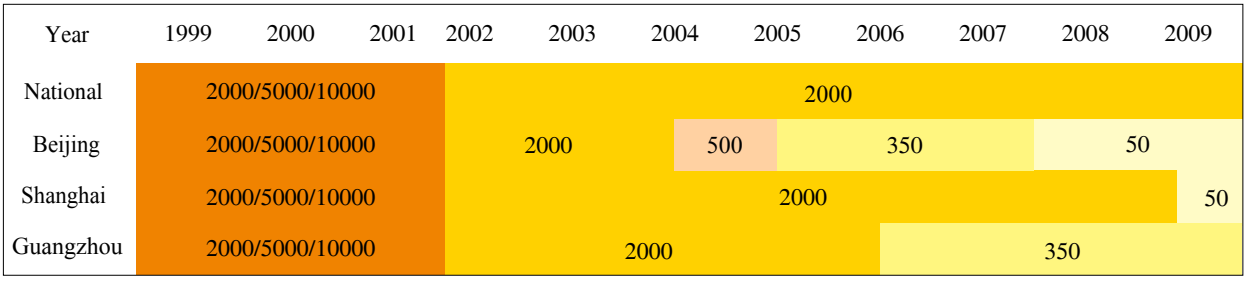
Figure 32 shows the limit values and implementation dates for sulfur content of fuels in China. It should be noted, though, that China's process of desulfurization still lags behind the improvement in vehicle emission standards. The time difference between these two is shown in Figure 33.

Units：mg/kg



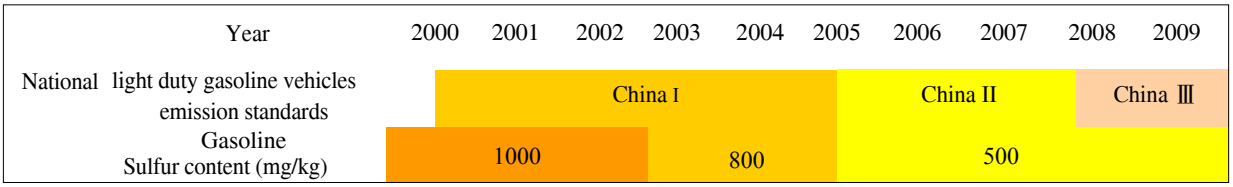
(a) Gasoline

Units：mg/kg

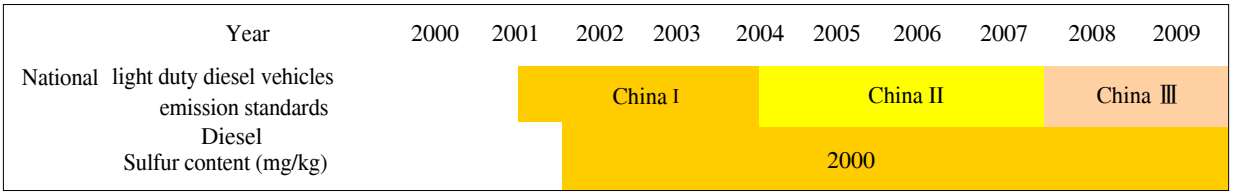


(b) Diesel

Figure 32. Limit values and implementation dates for sulfur content of fuels



(a)



(b)

Figure 33. Comparison of vehicle emission standards and fuel sulfur content

2. Environmental Management of Vehicle Fuels

Vehicle fuels are an important part of vehicle emission control. As vehicle emission standards become stricter and stricter, the impact of fuels on vehicle emissions becomes even more prominent. Although the development of new energy vehicles is flourishing, conventional petroleum fuels (gasoline and diesel) will still be a main vehicle energy source for a relatively long time. Therefore, improving the quality of gasoline and diesel fuels is still an important method of controlling vehicle pollution. Technically, the development direction for gasoline is desulfurization and lowering summertime RVP. For diesel, the development direction is desulfurization, increasing the cetane number, and reducing polycyclic aromatic compounds.

2.1 Environmental Management of Gasoline Detergents

Detergents are widely and commonly added to gasoline around the world to solve problems of deposit build-up in injectors, intake valves, and the combustion chamber. International experience has proven that the gasoline detergents are an important and effective method to reduce emissions. Through the end of 2009, 11 products from 11 such manufacturers have been registered and recorded by the Ministry of Environmental Protection.

Box 4: Lead Phase-out For Motor Vehicle Gasoline

In 1998, the State Council General Office issued the "Notice on Deadline to Stop Production and Sales of Leaded Gasoline" (State Council Document No. [1999]129), requiring that all gasoline production companies stop producing leaded gasoline by January 1, 2000, and all motor vehicles must stop using leaded gasoline by July 1, 2000. According to the regulation "Notice on Adjustment of Leaded Gasoline Sales Tax Rate" (Ministry of Finance Document No. [1998]163) issued by the Ministry of Finance and State Administration of Taxation, beginning from January 1, 1999, leaded gasoline was taxed with 0.28 RMB/liter consumption tax, while unleaded gasoline was taxed at 0.20 RMB/liter. This price adjustment hastened the nationwide phase-out of leaded gasoline. From 2000, China began implementing the first stage of vehicle emission standards, which succeeded in introducing closed-loop electronically-controlled fuel injection and three-way catalyst technologies and greatly reducing emissions from gasoline vehicles.

2.2 Oil Vapor Recovery

In 2007, China issued three standards – "Oil storage tank air pollutant emission standards," "Gasoline transport air pollutant emission standards," and "Refueling stations air pollutant emission standards" – requiring hydrocarbon emission control for oil storage tanks, oil delivery trucks, and refueling stations. In order to meet the air quality requirements of the 2008 Beijing Olympics and Paralympics, before May, 2008, Beijing implemented vapor control throughout the entire city, including 1442 refueling stations, 1400 oil delivery trucks, and 37 oil storage tanks. Tianjin City and designated cities in Hebei province also basically completed the vapor control work for refueling stations, oil storage tanks, and oil delivery trucks. According to the standards, the Yangtze River Delta, Pearl River Delta, and other designated cities nationwide will continue the work of vapor control. Through the end of 2009, Shenzhen had already implemented control on over 90% of refueling stations, oil delivery trucks, and oil storage tanks. Guangzhou, Shanghai, Jinan, Nanjing, Hangzhou, and other areas are also actively carrying out this control work.

Appendix: Vehicle Classifications

Type		Size	Description
Motor Vehicle	Passenger	Large	Vehicle length is not shorter than 6000mm or the Approved Passengers Capacity is not less than 20
		Medium	Vehicle length is shorter than 6000mm or the Approved Passengers Capacity is more than 9 and less than 20
		Small	Vehicle length is shorter than 6000mm or the Approved Passengers Capacity is less than 9
		Mini	Vehicle length is not longer than 3500mm and the displacement does not surpass 1000ml
	Goods	Heavy	Gross mass is not less than 12,000kg
		Medium	Vehicle length is not shorter than 6000mm or the gross mass is between 4500kg and 12,000kg, not including low-speed vehicles
		Light	Vehicle length is shorter than 6000mm and the gross mass is less than 4500kg, not including mini trucks, three-wheeled and four-wheeled low-speed vehicles
		Mini	Vehicle length is shorter than 3500mm and the gross mass is less than 1800kg, not including three-wheeled and four-wheeled low-speed vehicles
Low-speed vehicle	Three-wheeled		Diesel-powered, the maximum design speed is not more than 50km/h, and the maximum gross mass is not more than 1200kg. Vehicle length is not longer than 4.6m, width is not more than 1.6m, and height is not more than 2m
	Four-wheeled		Diesel-powered, the maximum design speed is not more than 70km/h, and the maximum gross mass is not more than 4500kg. Vehicle length is not longer than 6m, width is not more than 2m and height is not more than 2.5m
Motorcycle	General		Maximum design speed is more than 50km/h or the cylinder exhaust emission capacity is more than 50ml
	Moped		Maximum design speed is not more than 50km/h, if engine-driven, the cylinder exhaust emission capacity is not more than 50ml