



# Current Status and Outlook for China's Oil Market

**CNPC Economics & Technology Research Institute**

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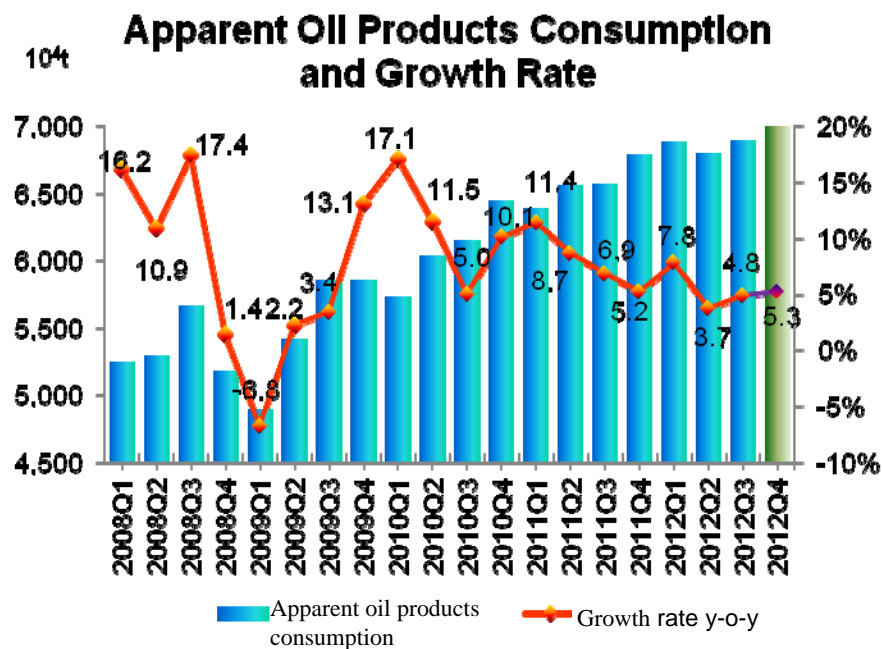
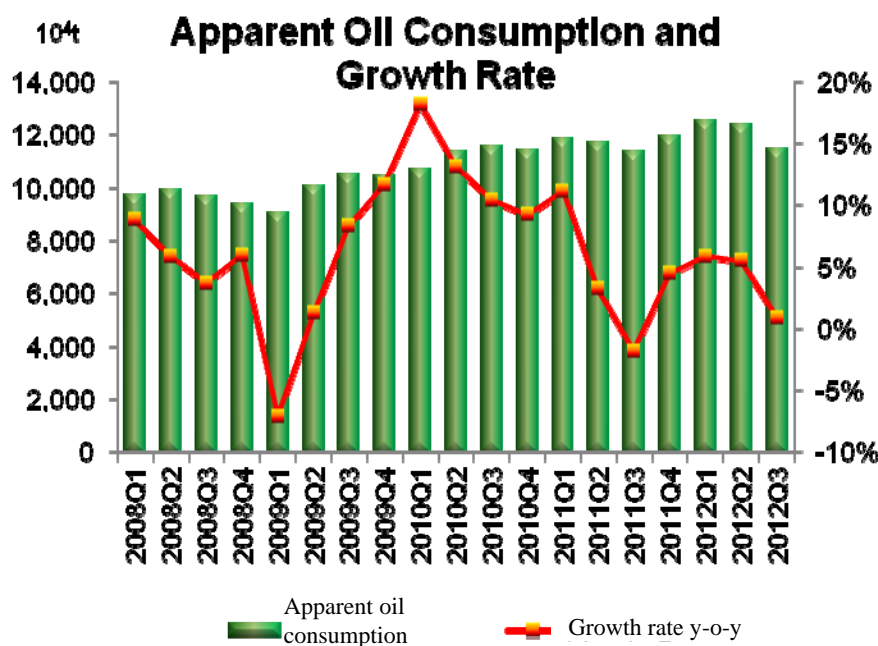
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## (I) China's oil consumption grew smoothly in recent years

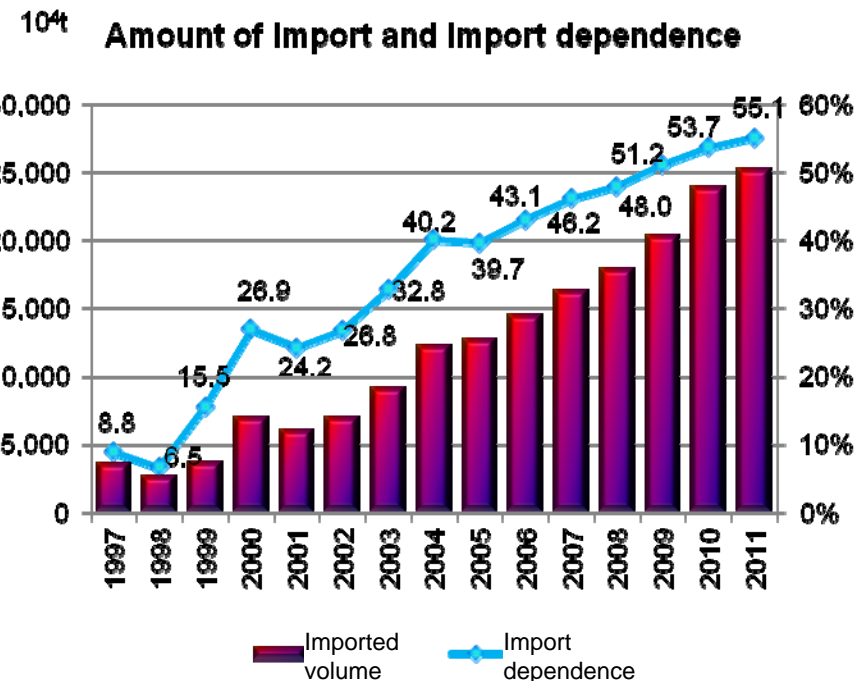
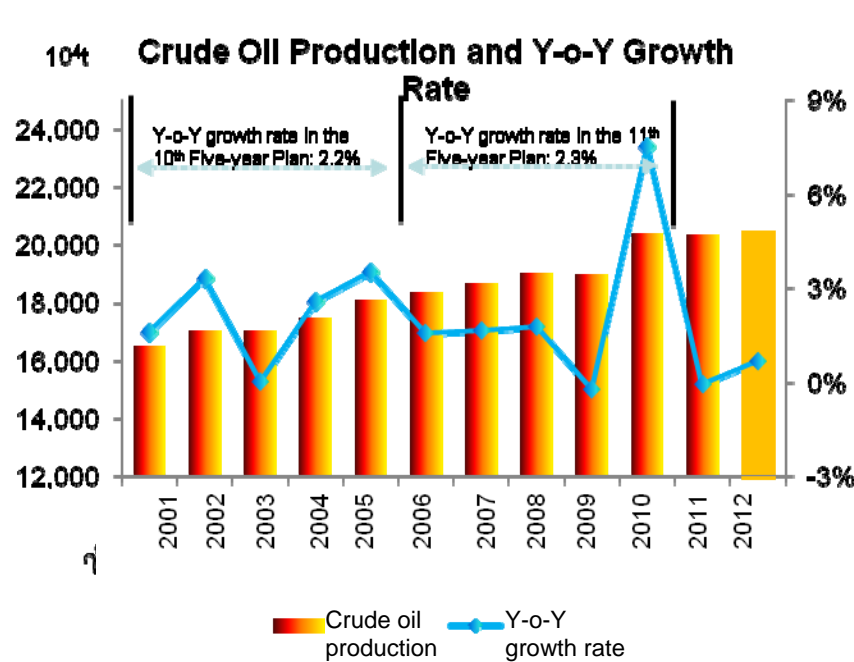
➤ Financial crisis once made China's oil demand shrink. In Q1 of 2009, the oil consumption reduced greatly by 7.2% and rebounded due to the incitation of national macroeconomic policy. From 2010, the oil consumption has recovered gradually. In the first three quarters of 2012, China's apparent oil consumption reached 363 million tons (MMt), up 4.1% year on year and flat with the figure in the same period of last year; the apparent oil products consumption was 203.317 MMt, up 4.8% year on year and at a growth rate 4.2% less than that in the same period of last year.





## (II) China's domestic oil production increased stably at a low rate, and oil import dependence rose year after year

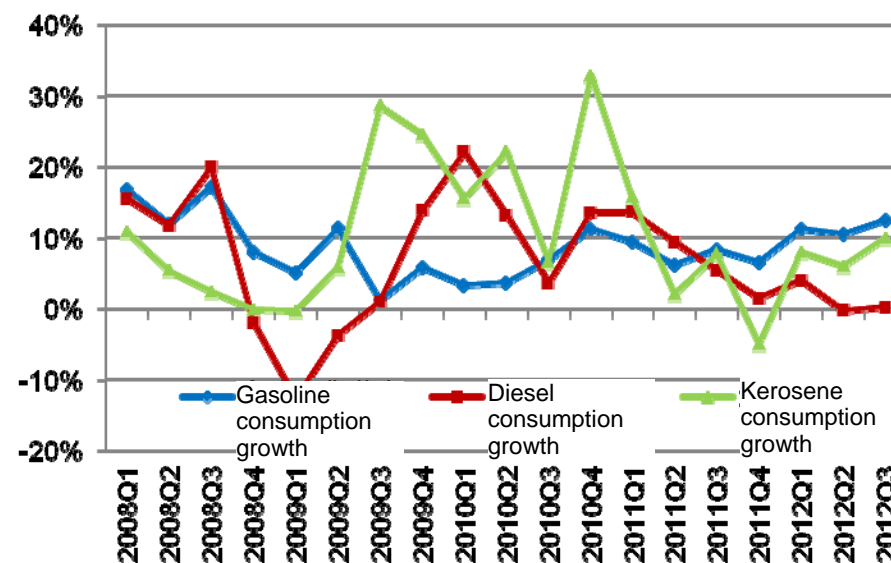
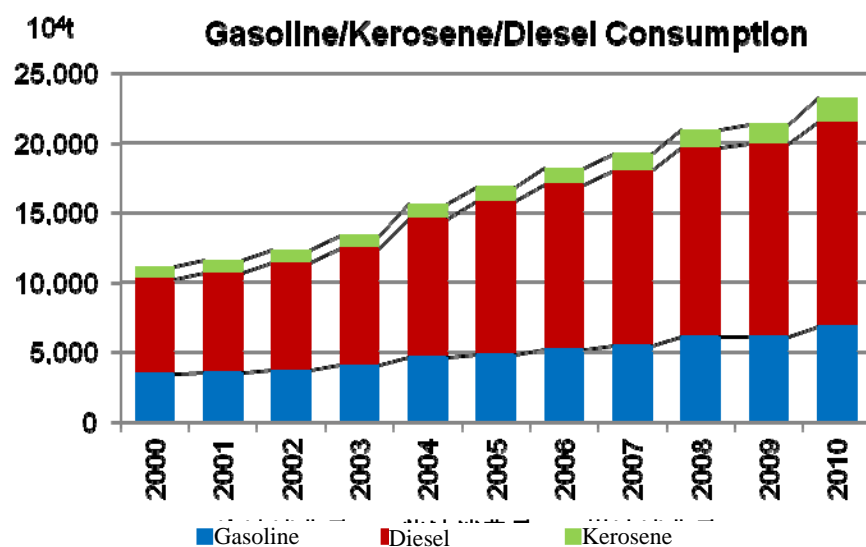
- During the period of 10<sup>th</sup> Five-year Plan and 11<sup>th</sup> Five-year Plan, China's domestic crude oil production increased by 2.2% and 2.3% respectively. The figure fell back to 0.3% in 2011, but recovered to 0.6% in the first three quarters of 2012, with oil production up to 154 MMt.
- China's crude oil import maintained at rapid growth, and import dependence rose year after year, from 48% to 56.5% in 2008~2011. The imported oil volume was about 200 MMt in the first three quarters of 2012, representing an increase of 6.4% year on year, with import dependence at 56.3%.





### (III) China's gasoline and kerosene demand grew fairly rapidly, but diesel demand at lowering rate

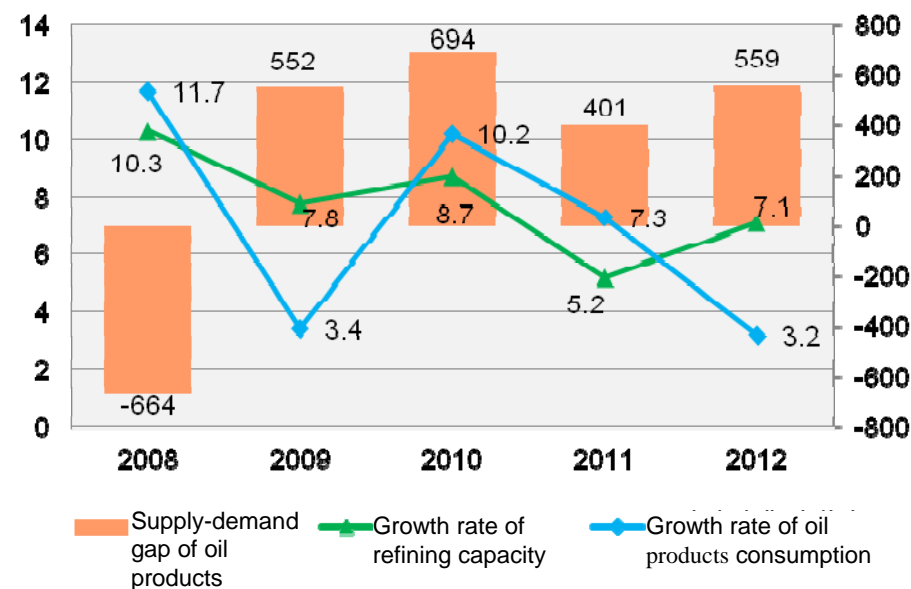
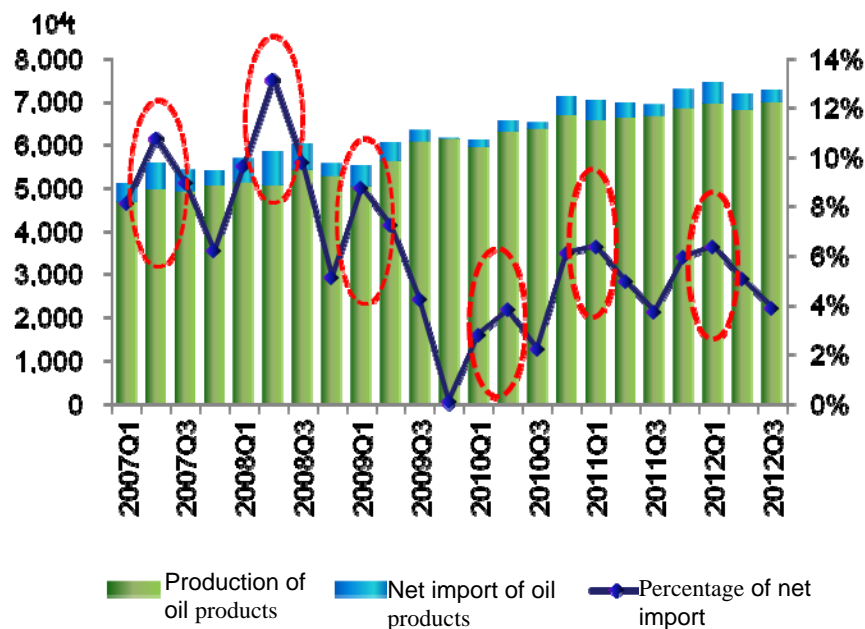
- Because of increasing vehicle sales, China's gasoline consumption remained at continuous and rapid growth. In the first three quarters of 2012, the apparent gasoline consumption in China was 62.996 MMt, increased by 11.5% year on year, and 3.5% higher than the same period of last year.
- Diesel demand was closely related to economic growth and industrial production. Due to economic downturn domestically, China's diesel consumption tended to grow at a lower and lower rate since the Q4 of 2010. In the first three quarters of 2012, the apparent diesel consumption was 125.882 MMt, increased by 1.4% year on year, and 8.1% lower than the same period of last year.
- In 2008~2011, China's total turnover of civil aviation, passenger traffic and cargo & mail turnover increased by 15.3%, 16.3% and 13.3% respectively year on year, driving the continuous and rapid of growth of kerosene consumption. In the first three quarters of 2012, the apparent kerosene consumption was 14.439 MMt, increased by 8.11% year on year, and flat with the figure in the same period of last year.





## (IV) China's oil products supply relied on domestic sources, and import/export played a role in seasonal and type regulation

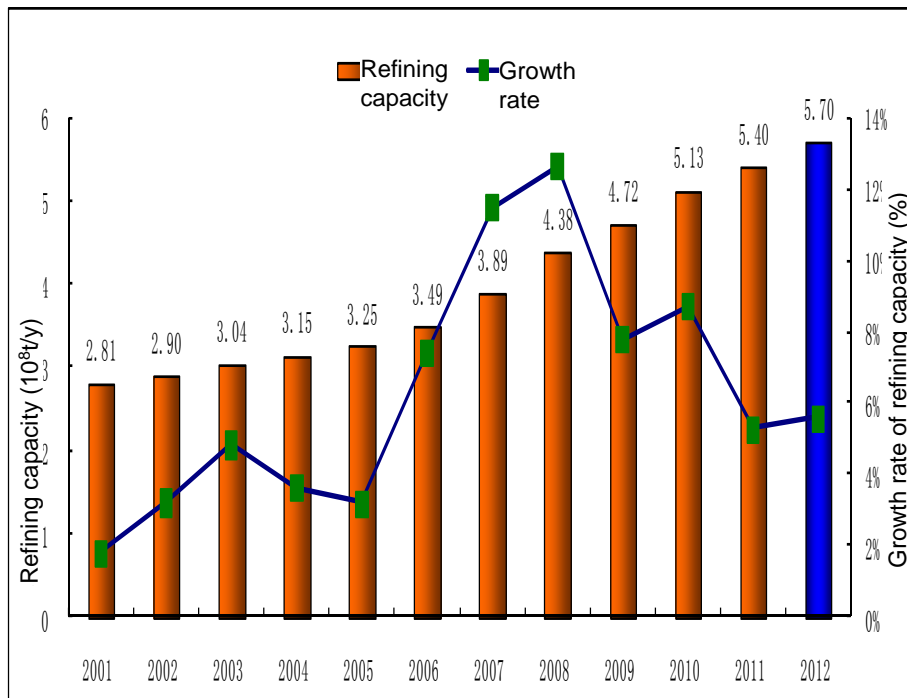
- Since the financial crisis, China's net oil products import has been staying at a low percentage in total consumption, and below 6.5% especially from the Q3 of 2009.
- China's refining capacity rose quickly in recent years, and domestic production of oil products generally kept in step with the consumption. In 2008, the gap between oil products supply and demand was 6.64 MMt; in 2012, a surplus of 5.59 MMt is expected, as a situation for the fourth consecutive year.
- The situation in past few years indicated that import/export played a visible role in seasonal and type regulation.





## (V) China's refining capacity improved steadily, and diversified pattern has been formed basically

- As the completion of many new and expanded/transformed projects, China's refining industry was extending consistently towards a large integrated R&C industry.
- By the end of 2011, China's primary oil processing capacity maintained at 540 MMt/y, in particular: CNPC, 170 MMt/y; SINOPEC, 250 MMt/y; CNOOC, 27 MMt/y; other local refineries, 100 MMt/y. A new diversified competition framework was set up, led by two major NOCs, consisting of several systems of ownership as well as both domestic and foreign investment.



Item	2005		2010		2011	
	Capacity 10 <sup>4</sup> t/y	As % of the state	Capacity 10 <sup>4</sup> t/y	As % of the state	Capacity 10 <sup>4</sup> t/y	As % of the state
Distillation	32455	—	51300	—	53950	—
SINOPEC	16350	50.29	23970	46.73	24720	45.82
CNPC	11935	36.79	16030	31.25	16930	31.38
CNOOC	—	—	2700	5.26	2700	5
Local refineries	4160	12.82	8600	16.76	9600	17.79

Source: ETRI



## (VI) China's refining layout was further optimized, and refinery configuration was adjusted more quickly

- China's refining industry highlighted regional layout by raising the capacity in South China where the refining capacity was inadequate and external assistance was required and controlling the capacity in Northeast China where the refining capacity was redundant and should transfer partially to other places. The share of South China in total national capacity in 2011 was 5.4% higher than 2005, and Northeast China 5.8% lower.
- The refinery configuration was adjusted to accommodate poor materials and higher requirement for oil quality. The hydrorefining capacity climbed from 15.6% in 2000 to 33% in 2012, while the catalytic cracking capacity declined from 36.1% to 30.7%.

**Composition of China's Key Refining Facilities in 2000~2011**

Facility	2000		2011		2012	
	10 <sup>4</sup> t/y	As % of primary processing capacity	10 <sup>4</sup> t/y	As % of primary processing capacity	10 <sup>4</sup> t/y	As % of primary processing capacity
Primary processing capacity	27400		53950		57450	
Catalytic cracking	9900	36.13%	16321	30.25	17626	30.68
Delayed coking	2114	7.71%	8621	15.98	8981	15.63
Catalytic reforming	1558	5.69%	3925	7.28	4085	7.11
Hydrocracking	1147	4.19%	4354	8.07	4794	8.34
Hydrorefining	4261	15.55%	17395	32.24	18935	32.96





## (VII) China's oil products market was increasingly diversified and open

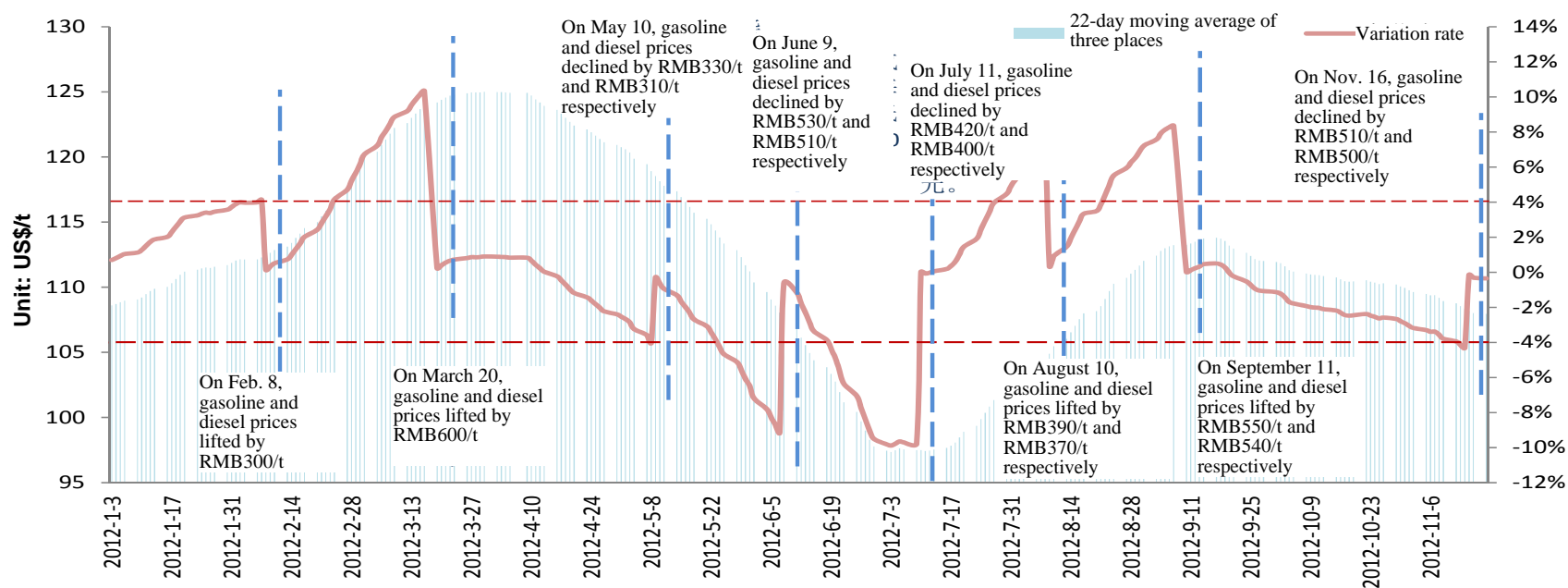
- Currently, NOCs dominate the oil products market in China. In 2011, the domestic apparent oil products consumption was 263 MMt, of which 145 MMt and 162 MMt were contributed by CNPC and SINOPEC respectively.
- With the deepening reform of circulation domain, foreign and private enterprises were allowed to access into China's oil products wholesale and retail market. They have emerged as active players in China's oil products market.
- At the end of 2011, the Ministry of Commerce qualified 196 enterprises for wholesale, including 55 enterprises directly affiliated to or held by five central enterprises (e.g. CNPC, SINOPEC, CNOOC, SINOCEM and China National Aviation Fuel), as only 28.1%, and 141 other enterprises (including 10 joint ventures), as 71.9%.
- According to the statics, among the 96,000 service stations, CNPC and SINOPEC own 19,000 stations and 30,000 stations, totally as over 50%; private stations come up to about 44,000, as 46%; and foreign-invested and jointly-invested service stations reach more than 2300.





## (VIII) The price regulation mechanism of oil products was more institutional

- On December 18, 2008, the State Council issued the “Notice on Implementing Reform of Oil Products Price and Taxes”, indicating that from January 1, 2009, Brent, Dubai and Cinto prices were based; when the average weighted price fluctuated with amplitude above 4% for 22 days in a row, the domestic oil products price might be adjusted properly.
- Since 2012, the average of referential Brent, Dubai and Cinto experienced 8 fluctuations with amplitude above 4%, while China government adjusted the domestic oil products price accordingly, i.e. 4 rises and 4 cut downs.



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## (I) Scenario design of economic growth

- Based on the Mid & Long-term Forecasting model of China's Oil Demand and Supply, China's macroeconomic development is analyzed and designed in three scenarios (GP, BAU and CT). Besides, as instructed by the spirit of the 18<sup>th</sup> National Congress of the CPC, the parameters for the BAU scenario are adjusted.
- GP – Government Planning: in the 12<sup>th</sup> Five-year Plan, GDP will grow by 7%; in 2020, GDP per capita will be more than doubled from 2000 and decline later (conservative);
- BAU – Business as Usual: grow moderately and then decline slowly;
- CT – Current Trend: in the 12<sup>th</sup> Five-year Plan, further grow from 2011, and then decline.

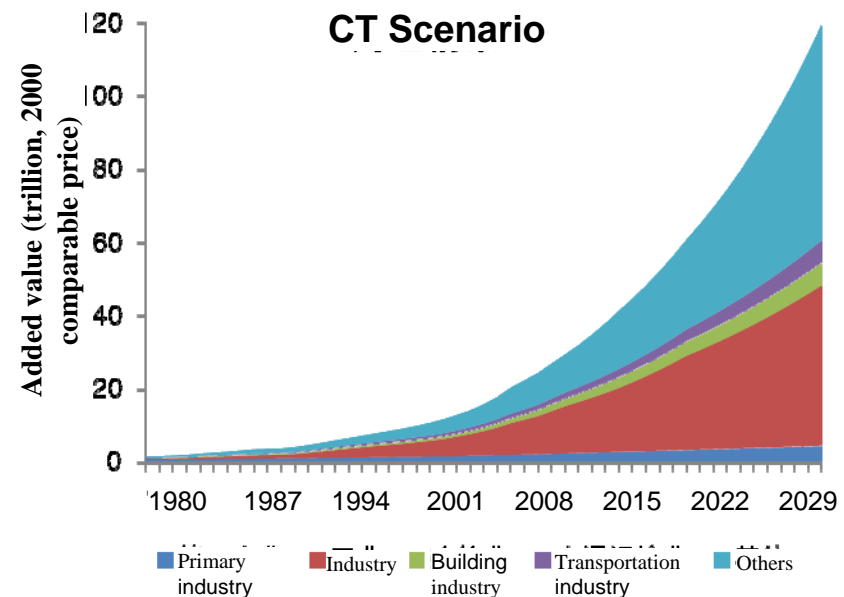
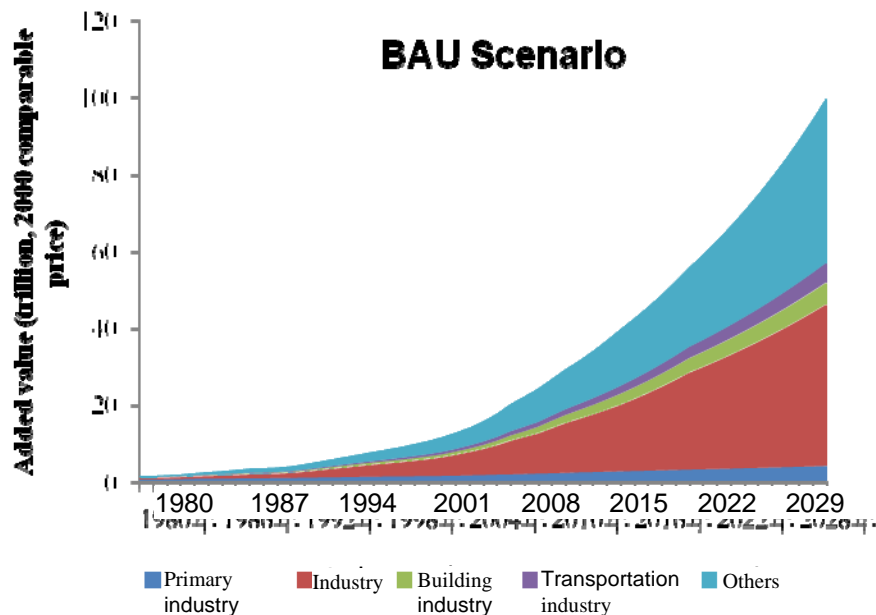
<b>GDP Growth Rate</b>	<b>2011~2015</b>	<b>2016~2020</b>	<b>2020~2030</b>	<b>2030~2050</b>
Government Planning	7%	5%	4%	3%
<b>BAU</b>	<b>8%</b>	<b>7%</b>	<b>6%</b>	<b>5%</b>
Current Trend	9%	8%	7%	6%



## (II) Macroeconomic forecasting – BAU

### ➤ Tertiary industry will take an increasing share in GDP, with optimizing structure

- The model predicts that the agriculture will grow steadily, and the added value of the industry will grow at a much slower rate, with its share in GDP climbing to the peak around 2030 and declining later.
- Added value of tertiary industry will take an increasing share in GDP in a long run, topping 50% after 2030 in the BAU scenario.

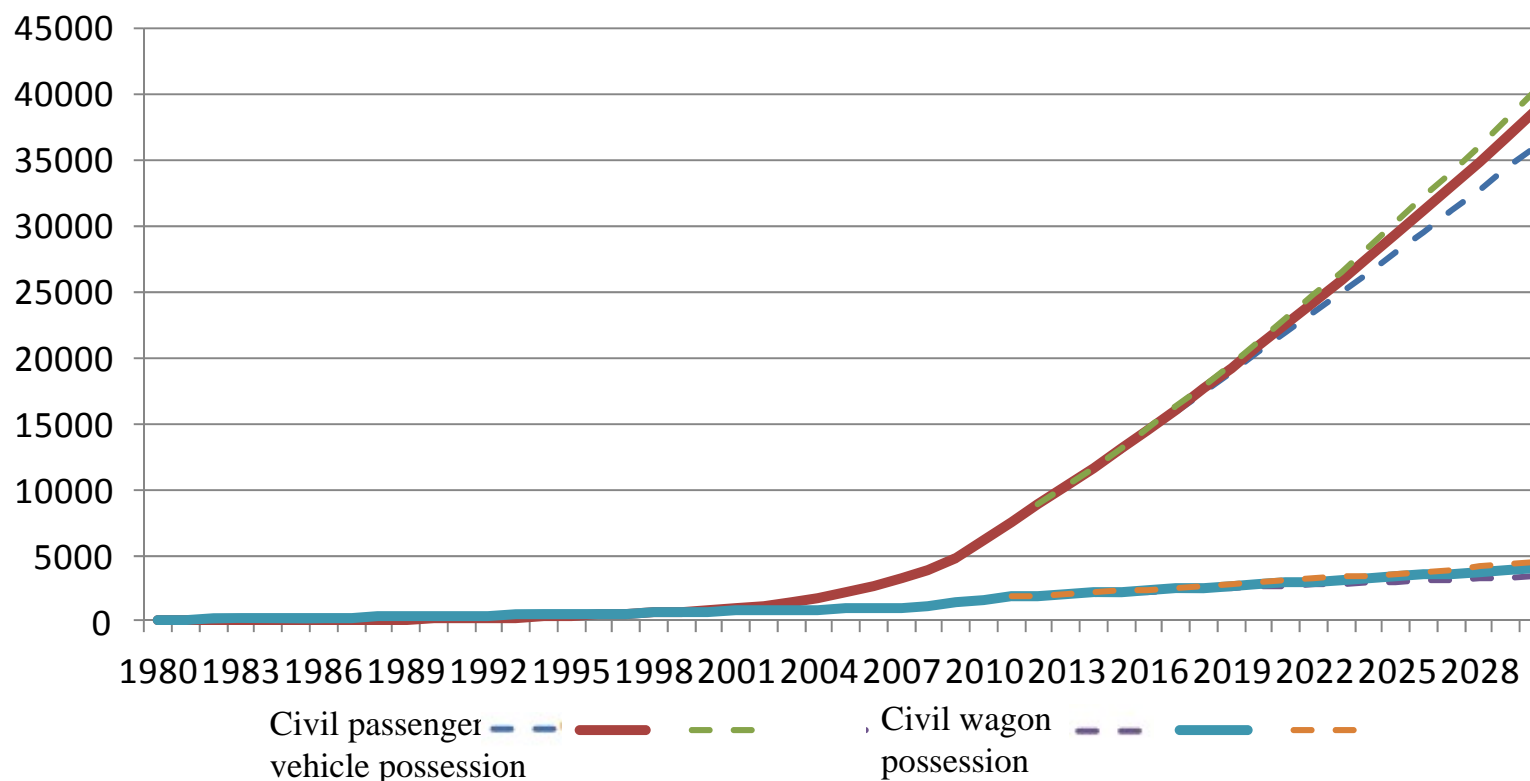




## (II) Macroeconomic forecasting – BAU

### ➤ Vehicle possession will increase at a much lower pace, but further grow as a whole

- Due to limited environment carrying capacity, resource carrying capacity and urban traffic capacity, the growth rate of China's vehicle possession will slow down significantly.
- By 2030, China's civil passenger vehicle possession will be 380 million, and civil wagon possession will reach 40 million, more than doubled from previous figure.

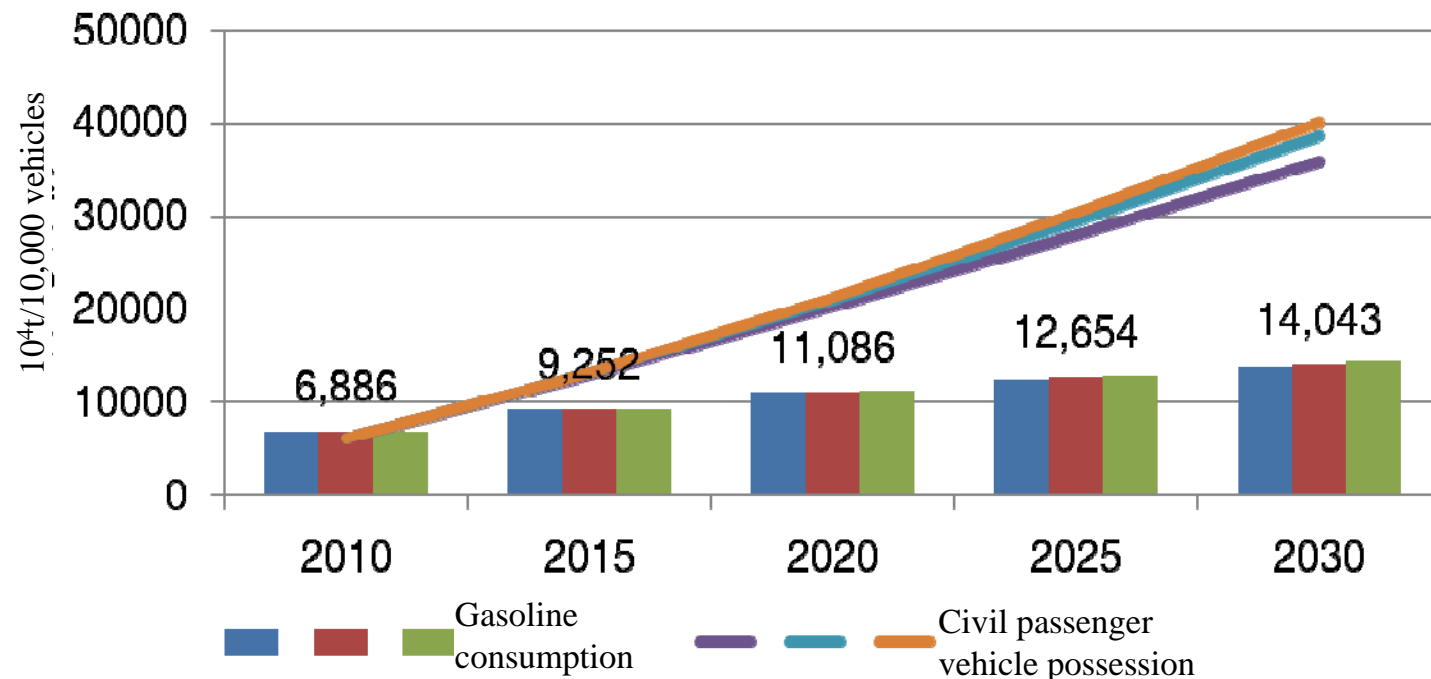




### (III) Oil products demand forecasting – BAU

#### ➤ Gasoline demand will keep rising stably

- Because of lower utilization ratio, higher fuel efficiency, increase of low-emission vehicles and other factors, the gasoline demand will grow much slower than the vehicle possession.
- China's gasoline consumption will be up to 110 MMt by 2020, up 4.9% year on year, and 140 MMt by 2030, up 2.4% year on year.

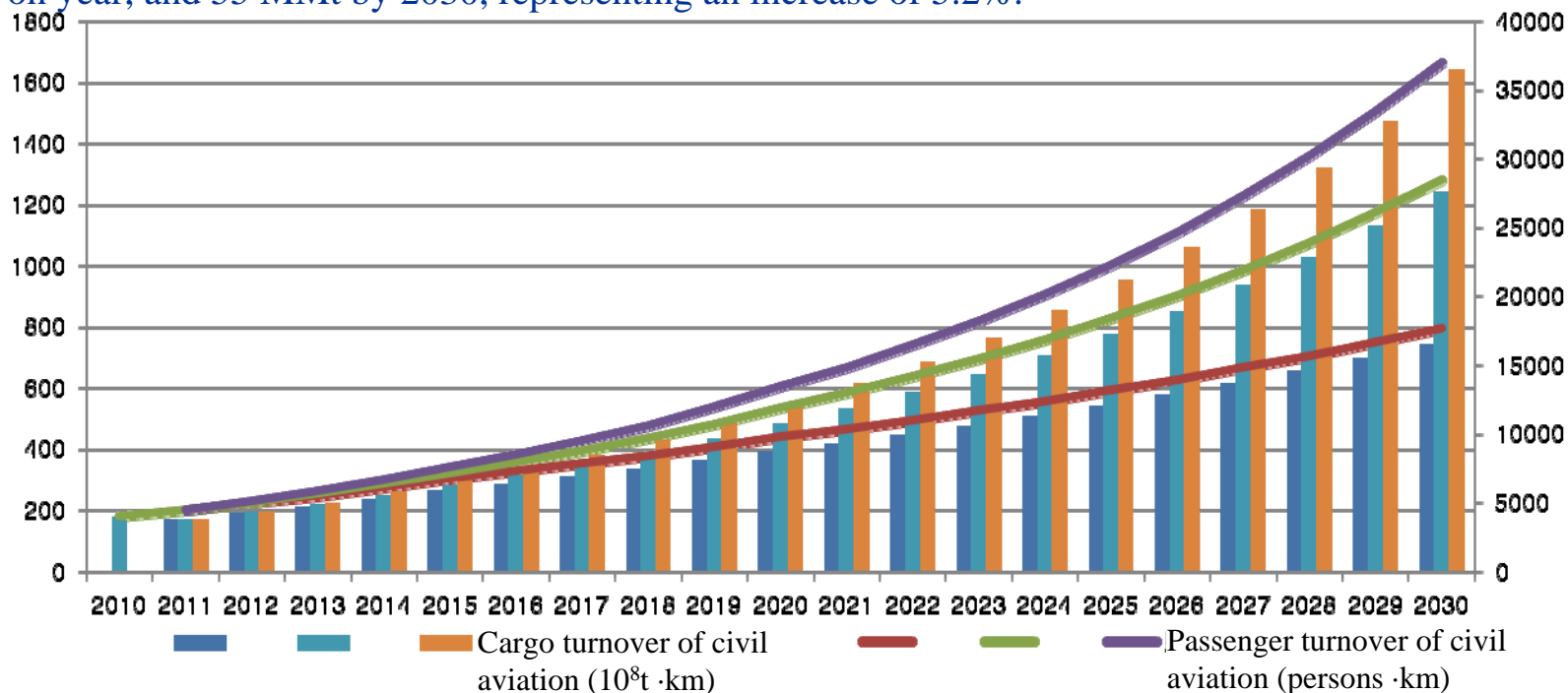




### (III) Oil products demand forecasting – BAU

#### ➤ Civil aviation has great potential and kerosene demand grows rapidly

- In the following 5 years, the civil aviation sector will enjoy an investment more than RMB1.5 trillion, and will realize passenger traffic up to 450 million persons and 230 airports, with over 4500 airplanes (incl. general-purpose planes).
- By 2030, China's both passenger and cargo turnovers will increase rapidly, driving the kerosene demand to rise vigorously.
- China's total kerosene demand will approach 33 MMt by 2020, representing an increase of 6.9% year on year, and 55 MMt by 2030, representing an increase of 5.2%.

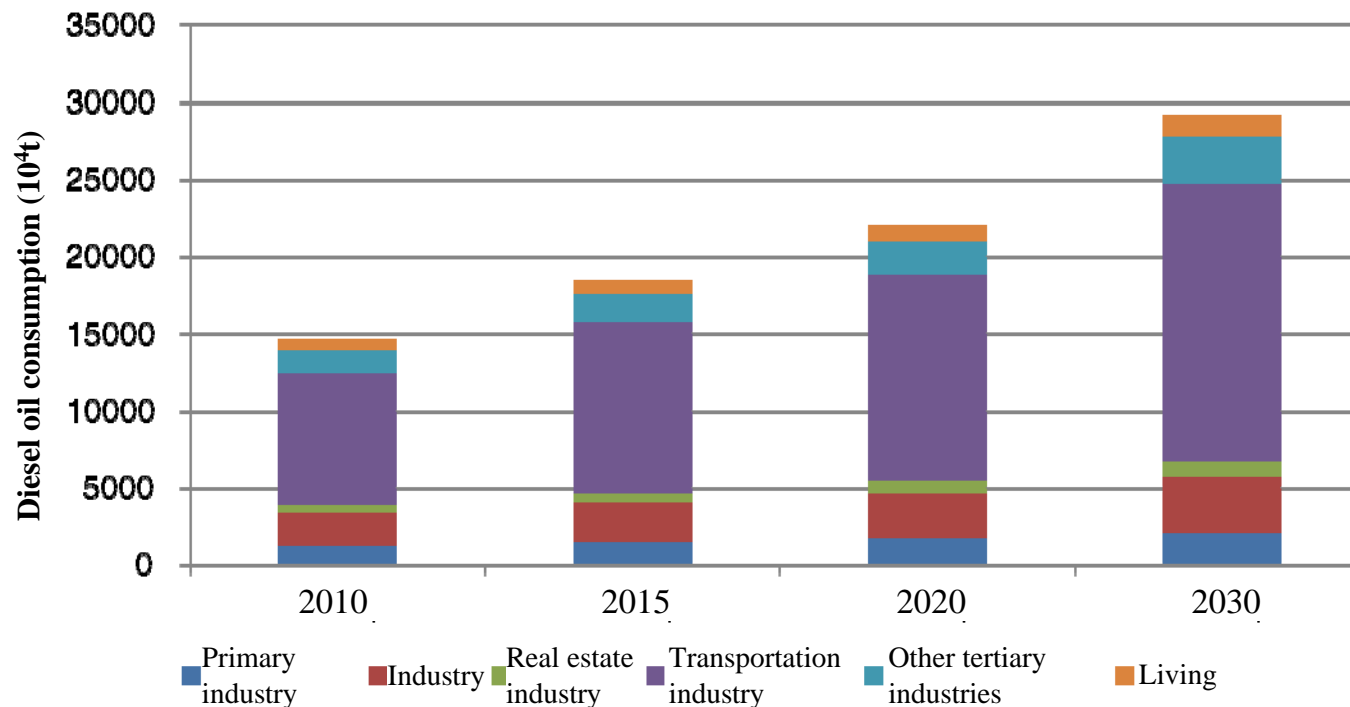






### (III) Oil products demand forecasting – BAU

- **Diesel oil demand will grow at a lower rate and proportion of transportation will rise**
  - Due to adjustment of economic structure, the growth rate of China's diesel oil demand will decline from 8% to 5%, and the diesel-to-gasoline consumption ratio will slide down greatly.
  - In the BAU scenario, China's diesel oil demand is expected to be 220 MMt by 2020, increased by 4.2% year on year, and will reach 290 MMt by 2030, of which 2/3 increment contributed by transportation, increased by 2.8% year on year.





## (IV) Oil demand forecasting – BAU

- Considering the substitutes of natural gas, fuel ethanol, fuel methanol, coal-to-oil and electric automobiles, and assuming that all oil products supply relies on domestic sources, China's oil demand will be about 588 MMt by 2020, representing an increase of 3.1% year on year, and 700 MMt by 2030, representing an increase of 1.7% year on year.

Year	Scenario	Estimated Oil Products Demand (MMt)			Alternative Energy	Total Oil Products		Oil Demand (MMt)	
		Gasoline	Kerosene	Diesel oil		w/o alternative	w/ alternative	w/o alternative	w/ alternative
2010	History	69	17	146	13	233		432	
2015	BAU	93	24	185	15	301	300	502	499
2020	GP	110	29	207	25	346	335	577	558
	BAU	111	33	220		364	353	607	588
	CT	112	36	229		376	365	627	608
2030	GP	137	42	252	48	430	396	662	609
	BAU	140	56	292		488	454	751	698
	CT	143	66	316		525	490	807	754

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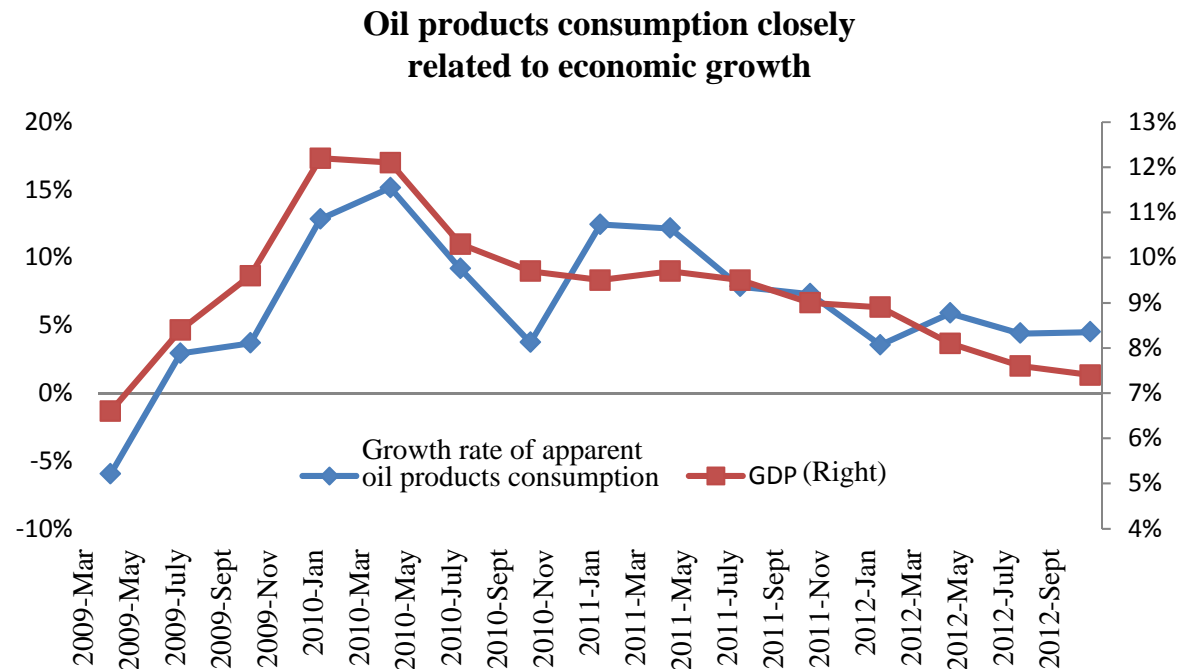


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## (I) China's oil demand elasticity is expected to decline and oil consumption efficiency to improve significantly

- The growth rate of China's oil consumption floats with the economic fluctuation, and the correlation coefficient thereof is up to 90%.
- China's GDP grew by 9.21% y-o-y, oil consumption rose by 2.75% y-o-y and oil demand elasticity coefficient was 0.3 in 1980~1990, while these figures were 9.85%, 6.27% and 0.63 respectively in 1991~2000, and 10.3%, 7.18% and 0.69 in 2001~2010.
- In 2011~2020, under higher fuel efficiency and shifting of economic structure, China's GDP will grow by 7.6%, oil consumption will rise by 3.1%, and oil demand elasticity coefficient will decline to 0.41.





## **(II) Rapid development of natural gas will affect the transportation oil demand greatly**

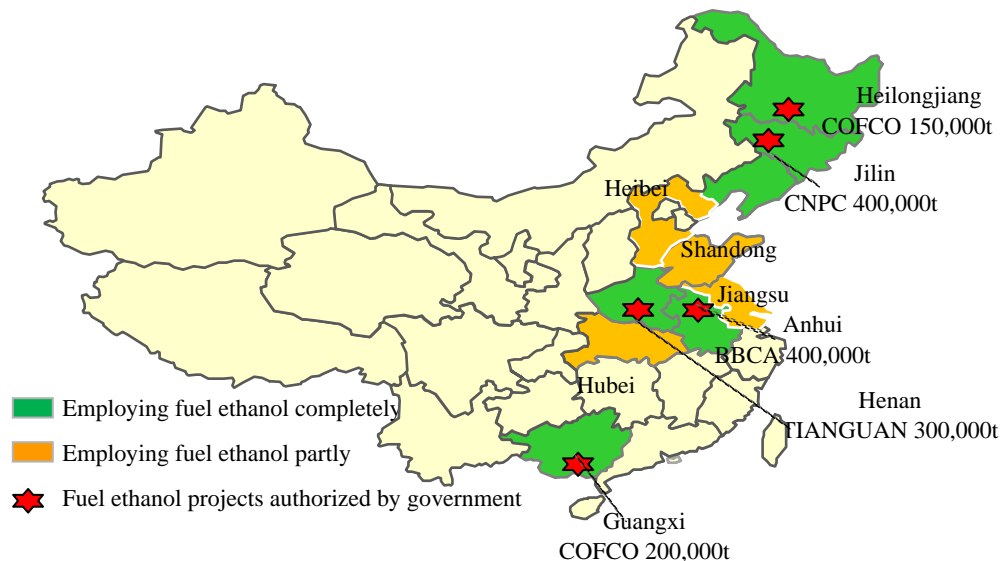
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- It is expected that in a long run, China's domestic gas price will remain more competitive than oil, and will be the most potential alternative fuel for vehicles that will be configured with more mature technologies.
- In 2011, the consumption in domestic transportation industry was more than 10 billion cubic meters, as 10% of China's total gas consumption, and equaling to about 7 MMt oil products.
- Assuming the gas demand is 350 billion cubic meters by 2020, of which 10% for automobile fuel, substituting 25 MMt of oil products consumption, together with industrial fuels and materials, the 30 million oil consumption will be substituted by natural gas in 2020.
- If the gas demand reaches 500 billion cubic meters by 2030 and 20% of which will be used to substitute oil products, the substituted oil amount will reach over 70 MMt.



### (III) Fuel ethanol and fuel methanol will not bring great substitution effect to the market

- There has been 6 provinces employing ethanol gasoline completely and 4 provinces demonstrating partly in China. Consumption of ethanol gasoline takes almost 30% of China's total gasoline consumption. Currently, the total capacity of fuel ethanol projects operating in China is only 1.50 MMt.
- The Mid-Long term Development Plan for Renewable Energy proposes to consume 10 MMt ethanol by 2020. However, due to inadequate grain supply in China, it is less impossible to meet the grain-based goal.
- In China, methanol is mainly produced from coal, for which the direct cost is low, but environmental cost is high, since such problems as toxicity and corrosion in utilization have not been addressed. The space for fuel methanol domestically is expected to be limited, and optimistically, will substitute about 3 MMt oil products by 2020.





## (IV) China's future oil products supply will depend on domestic sources

- In the following years, China's refineries will be constructed slightly ahead of the market, and processing capacity will remain at rapid growth. The government may still encourage the shutdown of small low-efficient refineries, and higher requirements are imposed upon new projects.
- By 2020, China will always depend on domestic sources for oil products, and import/export will uphold its role of seasonal and type regulation.

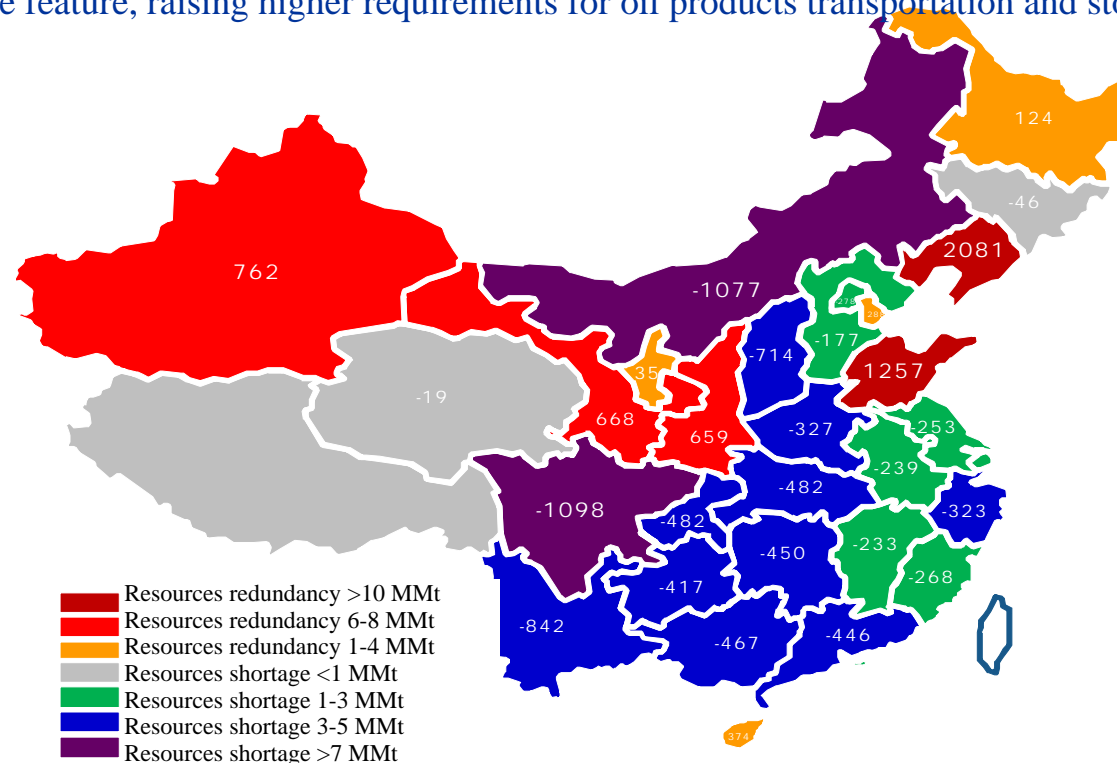
### Some Large Refining Projects Commissioned in China during 2012~2020

Group	Region	Name of Entity	Incremental Capacity 10 <sup>4</sup> t/y	Estimated Year of Commissioning
CNPC	North China	Hohhot Petrochemical	350	2012
	SW China	Sichuan Petrochemical	1000	2013
		Kunming Refinery	1000	2015
	South China	Jieyang Refinery	2000	TBD
		Taizhou Refinery	2000	TBD
SINOPEC	East China	Qilu Petrochemical	400	2015
		Zhenhai R&C #2	1200	2015
		Yangzi Petrochemical	450	2015
		Fujian R&C #2	1200	TBD
	South China	Maoming Petrochemical	1000	2012
		USTC Refining	1500	2014
		Jiujiang Petrochemical	350	2013
		Jingmen Petrochemical	200	TBD
CNOOC	Guangdong	Huizhou Refinery #2	1000	2014
	Hebei	Zhongjie Petrochemical	800	TBD
	Shandong	China Offshore Bitumen	350	2012
SINOCHEM	Fujian	Quanzhou Refinery	1200	2013
Total			16000	



## (V) China's oil products market is unbalanced, with visible step-like characteristics

- Due to refinery distribution and unbalanced regional economy, the production of oil products in most provinces in China is lower than the consumption.
- In coastal areas, Liaoning, Shandong, Tianjin and Hainan are net exporters, and others are net importers.
- The future commissioning of certain refineries in South China, Southwest China and East China will partly mitigate the situation that northern oil is transported to the south and western oil to the east. However, limited by economic growth, transportation conditions and resources distribution, China's market shows a visible step-like feature, raising higher requirements for oil products transportation and storage in China.







## (VI) China's clean oil products supply will remain as harsh task

- China's automobile gasoline and diesel oil are becoming cleaner and cleaner, but still far behind advanced foreign countries. Currently, China's gasoline and diesel oil meet China III standard; particularly, China V standard is followed in Beijing, and China IV standard is adopted in Shanghai and Guangzhou.
- At the 18<sup>th</sup> National Congress of the CPC, "conservation culture" is included into the overall plan for the first time, indicating that Chinese government will make more efforts in environmental protection, and the progress for clean oil will be accelerated. To meet the need for clear oil products, it is urgent to upgrade and transform the existing refineries in China, especially some old refineries.
- China IV gasoline is expected to apply in the whole nation by 2014; for diesel oil, the timetable may be later.

**Change of China's Gasoline Quality**

Application Year	2000	2005	2010	2014
Standard No.	GB17930-1999	GB17930-2004	GB17930-2006	Estimated
Corresponding emission standard	Europe I	Europe II	China III	China IV
Sulfur content, % (max)	0.08	0.05	0.015	0.005
Benzene content, % (max)	2.5	2.5	1	1
Olefinic content, % (max)	35	35	30	25
Aromatic hydrocarbon content, %	40	40	40	40

**Change of China's Diesel Quality**

Application Year	2000	2005	2012	Post-2014
Standard No.	GB252-2000	GB/T19147-2003	GB/T19147-2009	Estimated
Corresponding emission standard	Europe I	Europe II	China III	China IV
Sulfur content, % (max)	0.2	0.05	0.035	0.005
Cetane number	45/40	49	51	51
Polycyclic aromatic hydrocarbon, % (max)	—	—	11	11



## Main Conclusions

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- China's consumption of oil and oil products recovered steadily after the financial crisis. The crude oil production remained at stable growth at a low rate, and the crude oil import dependence rose year after year.
- Oil products supply will rely on domestic sources and import/export will continuously play a critical role of seasonal and type regulation.
- China's oil demand will maintain at rapid growth by 2030, at a rate of 3.1% in 2010~2020 and 1.7% in 2020~2030.
- Rapid development of natural gas will substitute the oil primarily for transportation. It is expected that about 30 MMt oil consumption is substituted by natural gas before 2020.
- At the 18<sup>th</sup> National Congress of the CPC, "conservation culture" is included into the overall plan for the first time. Need for clean oil is inevitable; however, meeting it will be a hard process.



# Thanks!

