



CNPC Economics & Technology Research Institute

**ETRI**

# China Energy Outlook 2050

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# **WORLD AND CHINA**

# **ENERGY OUTLOOK 2050**

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2018 VERSION



CNPC Economics & Technology Research Institute

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## **Base Scenario**

***BASE SCENARIO***

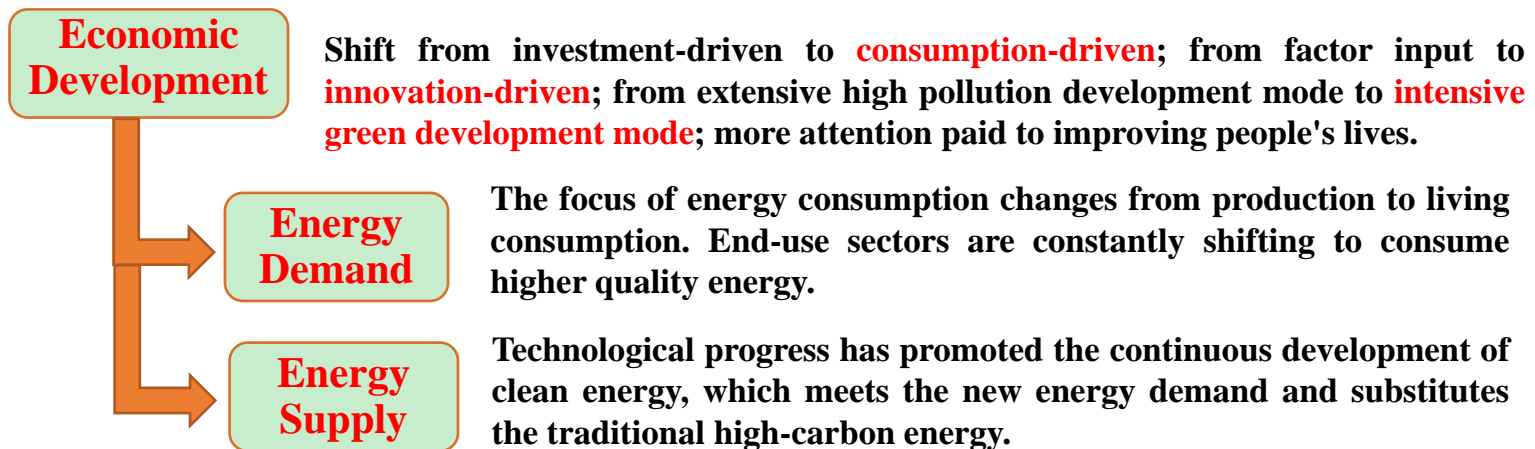


## Scenario Settings

Under the base scenario, China is facilitating all-round development in economic, political, cultural, social and ecological areas. China will basically achieve socialist modernization by 2035 and a modern powerful socialist country by 2050. The population will grow steadily before 2030, and then falls back slightly. Economic growth rate will remain at a reasonable level; growth momentum will continue to shift and core elements of growth will gradually shift from labor and capital to the improvement of total factor productivity. Industrial structure will be more optimized and the proportion of tertiary industry will steadily increase.

The relevant technologies and processes of energy production, processing, conversion and end use all make continuous progress in accordance with the current development trend. Chinese policies on energy, climate and environmental protection have been effectively implemented, the revolution in energy production, consumption, technology and system has been steadily promoted, and the quality and efficiency of energy system have been continuously enhanced.

### Continued transition of drivers of economic and energy development:





## Scenario Settings

Under the base scenario, China will basically realize socialist modernization by 2035 and a modern powerful socialist country by 2050. Driven by the implementation of policies such as “universal two kids” and the steady growth of life span, there is still room for population growth in China by 2030, but the growth will be limited. Core factors driving China's economic growth in the future will gradually shift from labor and investment to total factor productivity. Industrial structure will also be optimized to a higher level and the proportion of the tertiary industry will increase steadily.

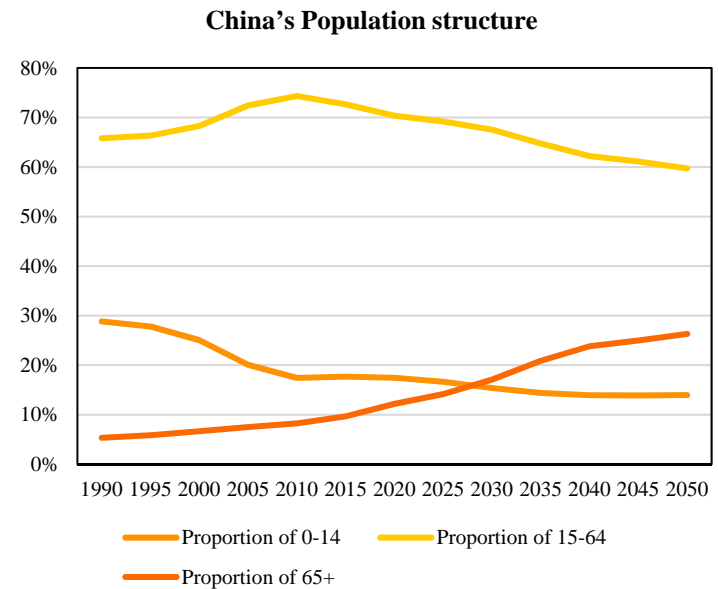
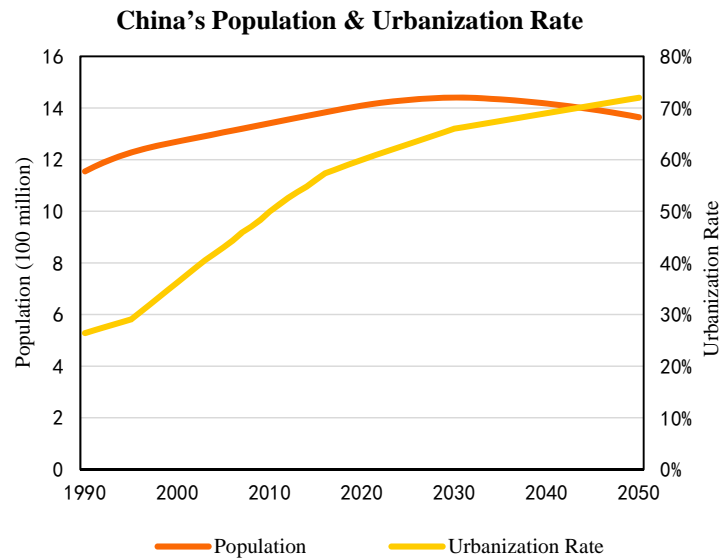
Relevant technologies and processes in energy production, processing, conversion and end-use are progressing in accordance with the current development trend, energy efficiency improves steadily, and new technology costs are declining. Revolutionary breakthroughs in energy-related technologies before 2030 will be less likely and wind, solar and other renewable energy sources are developing steadily, and the trend of scaled replacement of conventional energy sources is gradually clear.

Policies will change the direction and speed of energy transition. As China enters the post-industrial era, consumption transformation and upgrading and people's living standards are improved, the requirements for energy supply security and stability, price rationality and ecological and environmental friendliness will be more stringent. Under the base scenario, China's various energy, climate and environmental protection policies have been effectively implemented, and the energy production, consumption, technology and institutional revolutions have been steadily advanced, and the quality and efficiency of the energy systems have been constantly improved.



## China's urbanization rate continues to increase, with 200 million people moving into the town

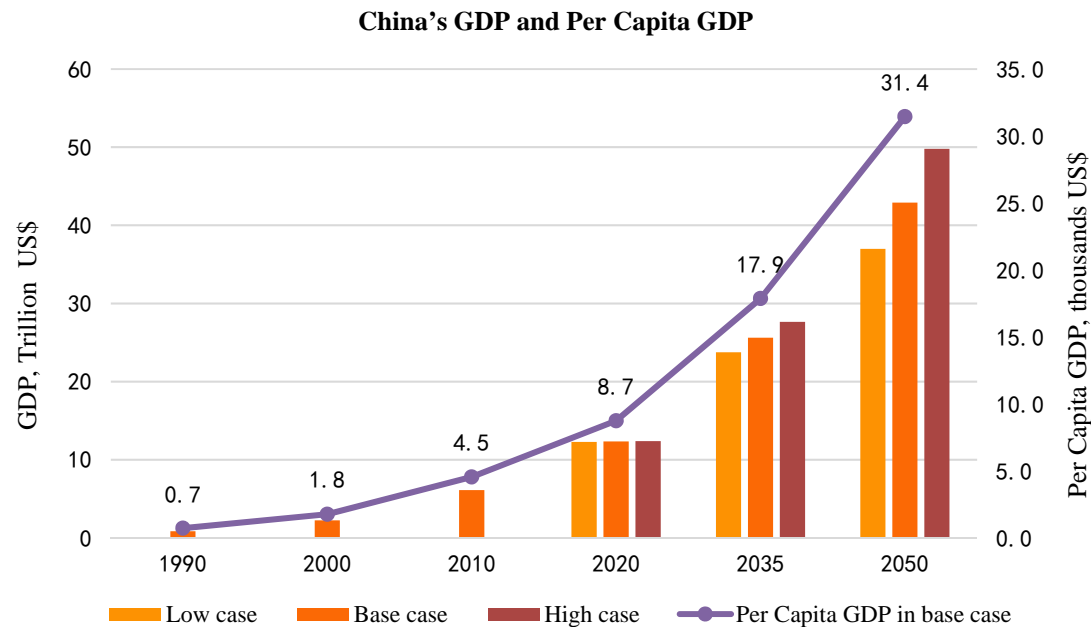
- China's population is expected to reach its peak around 2030, close to 1.45 billion, and it will decline slowly since then.
- The urbanization rate has steadily increased. The urbanization rate by 2035 and 2050 will be 68% and 72% respectively, and the urban population will be close to 1 billion.
- Expansion of average life span and decline in birth rate will lead to a steady increase in the proportion of people over 65, which will reach 21% and 26% respectively by 2035 and 2050.





## China's economic growth has gradually slowed down, and per capita GDP will grow steadily

- Before 2020, China's economy will remain growing at a middle and high speed, with an average annual growth of about 6.7%; in 2021-2035, it will shift to a medium-speed, with an average annual growth of about 5%; in 2036-2050, it will reach a stable growth stage, with an average annual growth of about 3.5%.
- China's per capita GDP will continue to increase, reaching about US\$31,400 in the middle of this century.



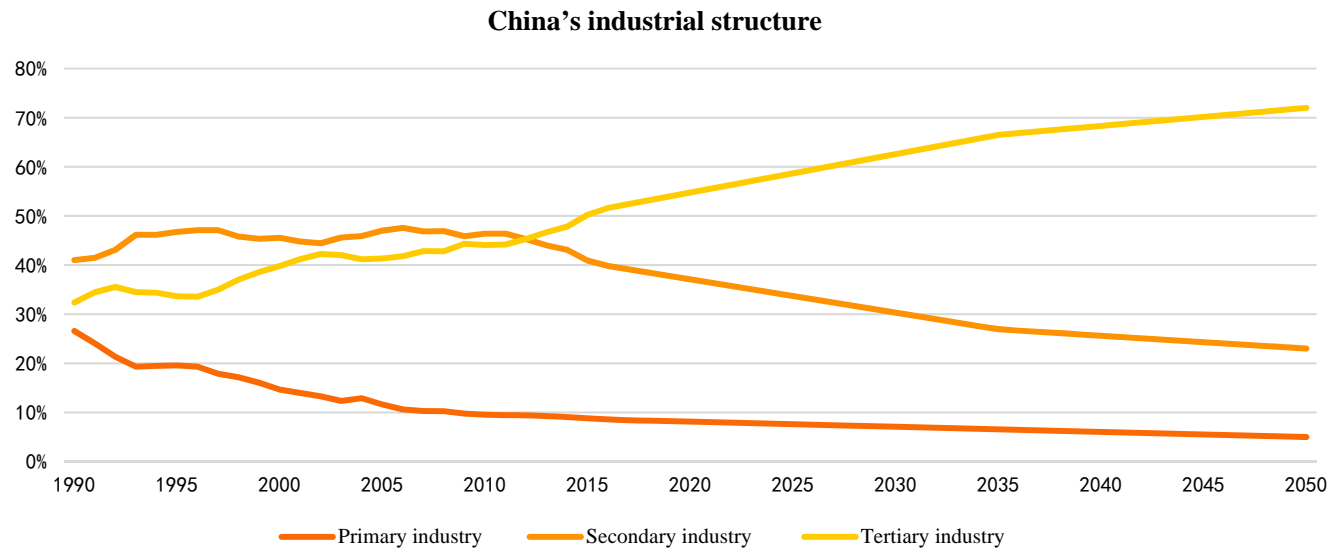
Note: three cases for China's economic development were designed, and the result of the base case was chosen for this study.





## China's economic structure continues to upgrade

- By 2020, the industry will move toward the middle and high-end level, the proportion of the service industry will continue to increase, and the agricultural modernization will achieve positive results. Proportions of the three industry sectors will be 8:37:55. By 2035, the proportion of the tertiary industry will rise steadily and dominate the economic development, and the proportions of the three industry structure industries will evolve to 5:28:67; by 2050, China will become a country with powerful service industry and the global high-end service industry cluster center, and then, the three-industry structure will evolve to 5:23:72.



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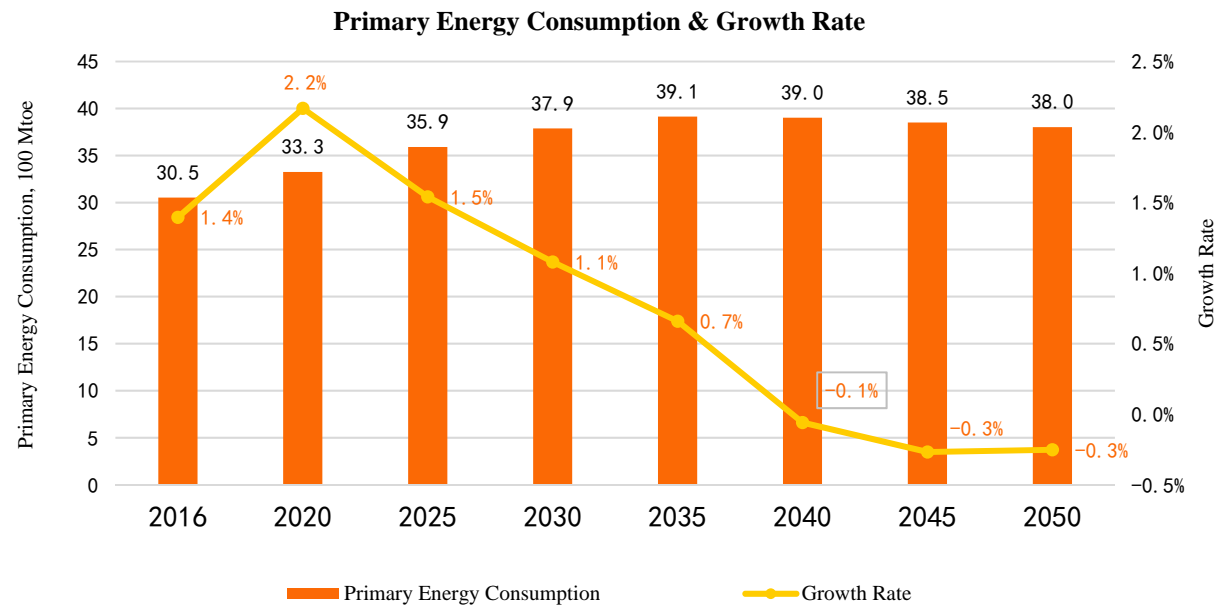
## Primary Energy

*BASE SCENARIO*



## China's primary energy demand will peaked and plateau after 2035

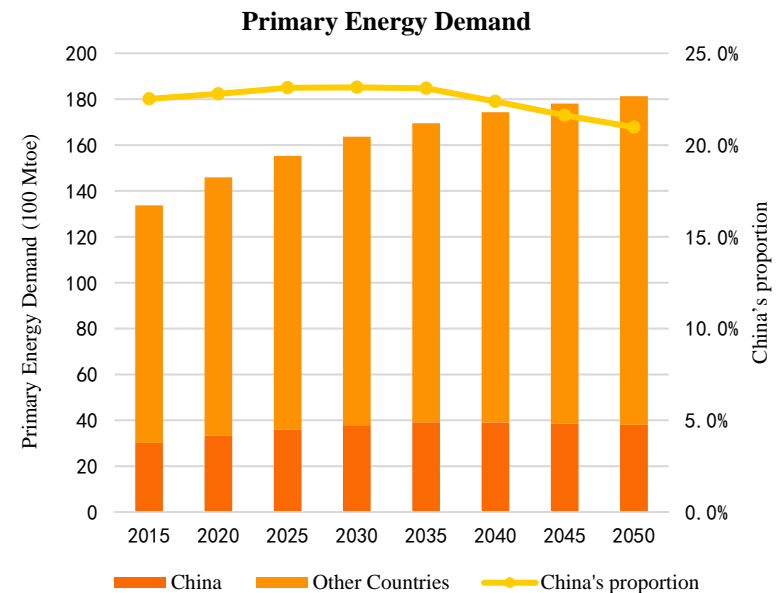
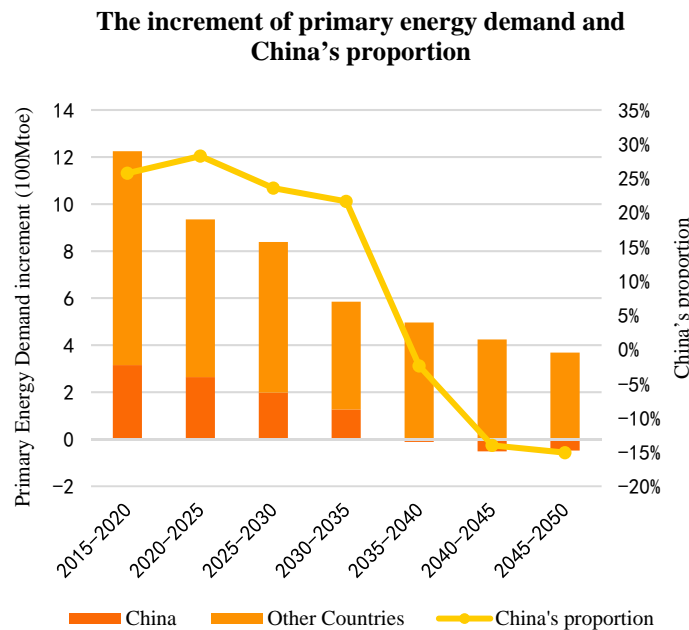
- The optimization and upgrading of the economic structure and the slowdown in the urbanization process will lead to a gradual slowdown in primary energy demand growth: from 2015 to 2020, the average annual growth rate will be 2%, while it is 1.1% in 2020-2035 and -0.2% in 2035-2050.
- Primary energy demand will peak and plateau around 2035 at around 3.91 billion tons of oil equivalent (5.6 billion tons of coal equivalent).





## The share of China's primary energy consumption in world's will fall after 2035

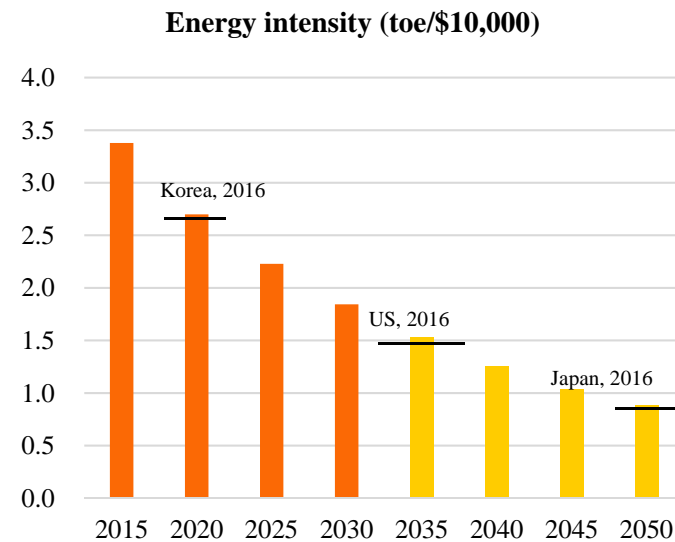
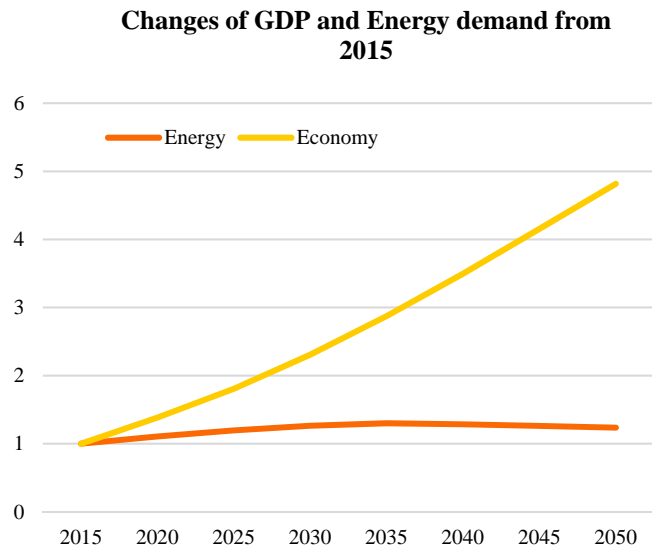
- Before 2035, due to the large energy consumption base, China will continue to be the main driving force for global energy consumption growth, and the proportion to the global primary energy consumption will keep at around 23%.
- After 2035, China's energy demand will gradually decline, driving the overall decline of the global primary energy demand.





## China's energy intensity will continue to decline

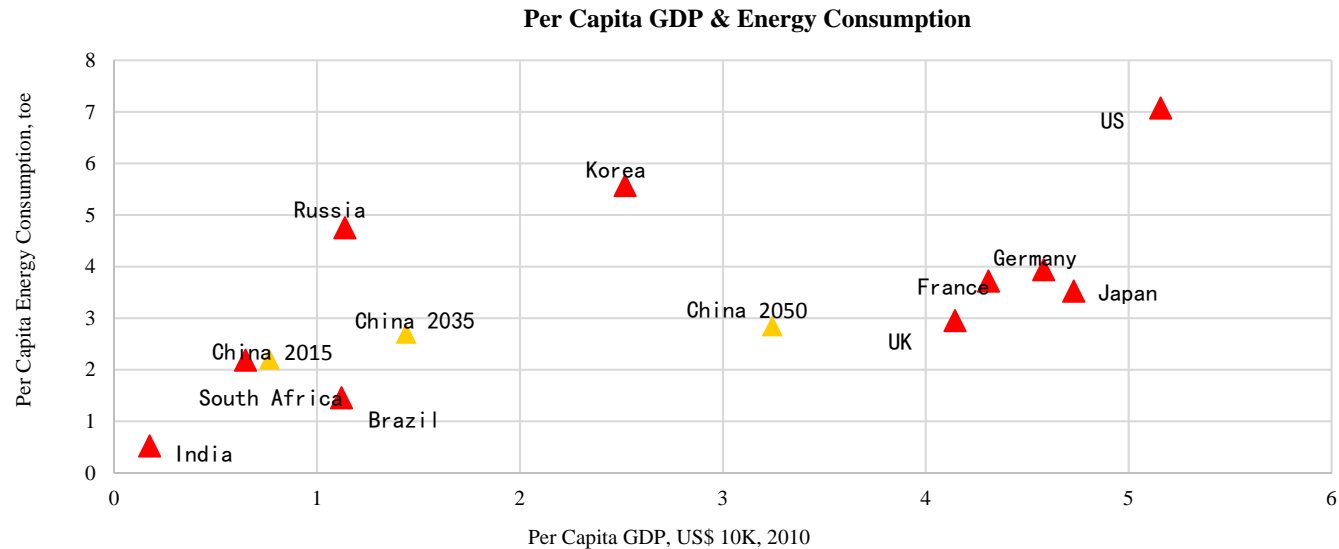
- As the process of urbanization and industrialization draws to a close, economic growth will be mainly driven by the improvement of the efficiency of total factor productivity, and the demand for energy resources per economic growth in China will gradually decrease.
- By 2035 and 2050, China's energy consumption per unit of GDP will drop by 54.8% and 74% respectively compared with 2015; the energy consumption per unit of GDP by 2035 will be similar to that of the United States in 2016, and by 2050 similar to that of Japan in 2016.





## Per capita energy consumption will increase steadily

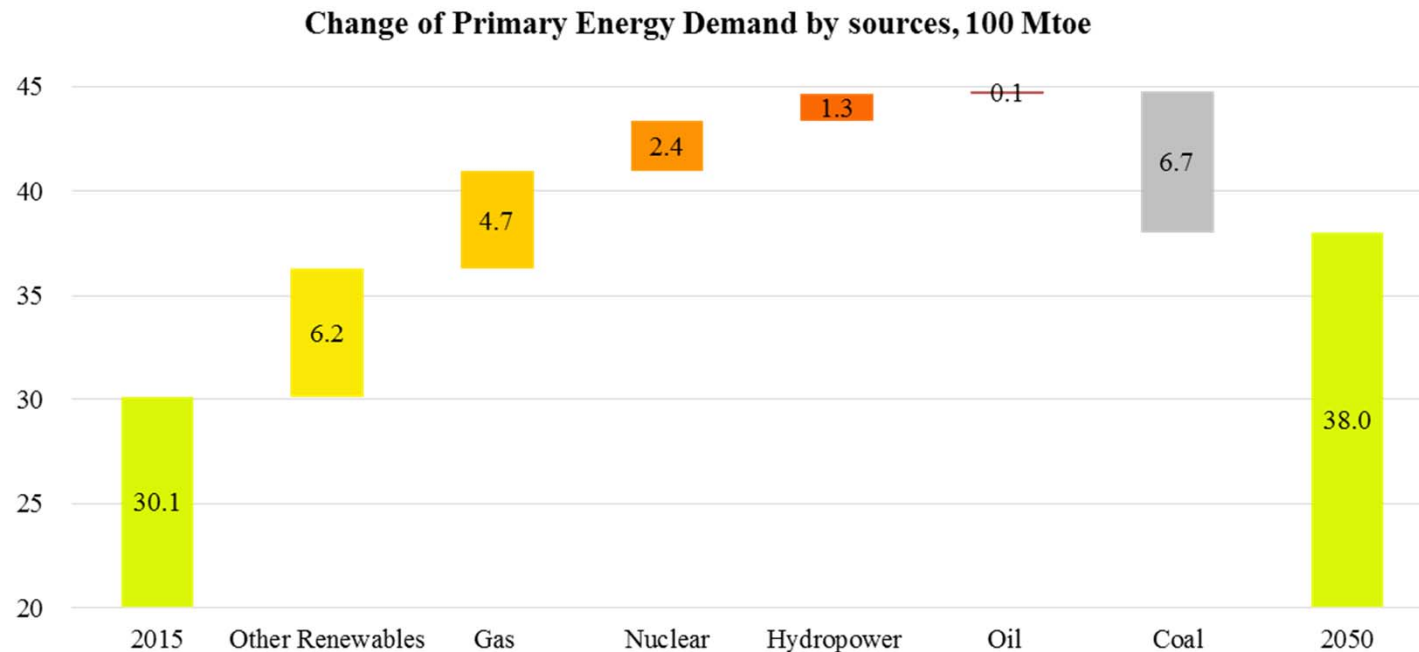
- Due to differences in resource endowments, industrial structure, consumption habits, and climate, countries have different per capita energy consumption, but that of developed countries is generally higher than that of developing countries.
- China's energy development will continue to play an important role in solving energy poverty and improving the quality of life of residents. The per capita energy consumption will gradually increase from 2.18 toe in 2015 to 2.73 toe in 2035, similar to the per capita energy consumption of UK in 2016, but significantly lower than that of the United States.





## Transition from conventional to new energy will continue, and cleaner energy will meet the incremental demand and optimize the stocks

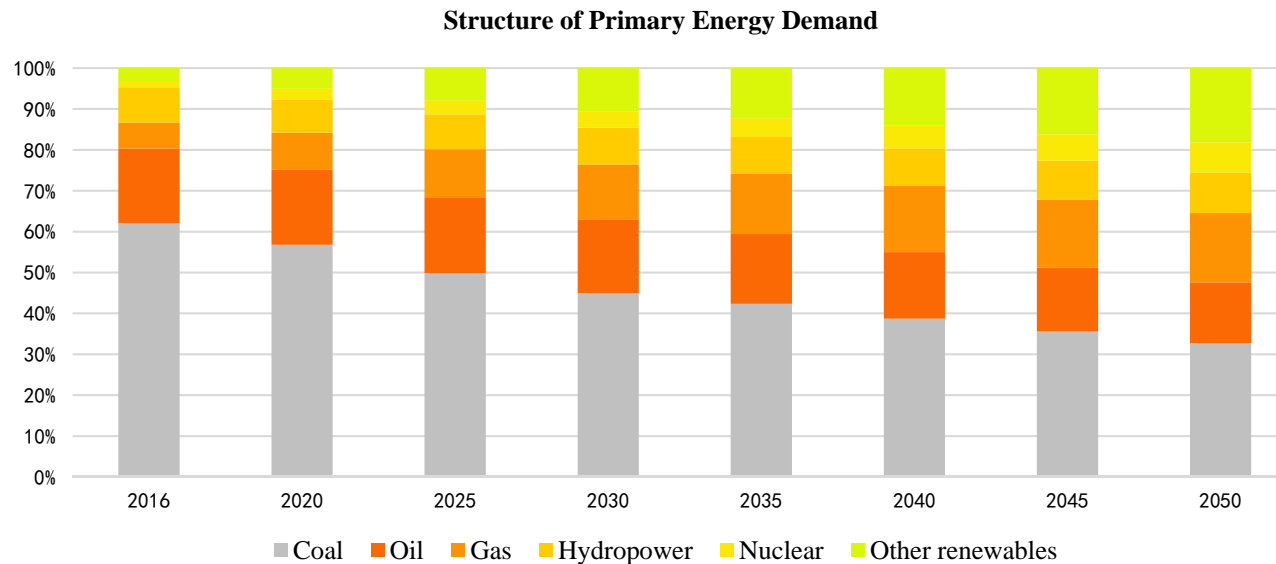
- Before 2035, non-fossil fuels will develop rapidly, fossil energy will develop in a different manner, natural gas will continue to grow rapidly, oil demand will increase slowly, and coal demand will decline steadily.
- After 2035, among the non-fossil energies, wind power, solar energy etc. will continue to develop rapidly, becoming a direct substitute for coal and oil.





## China's future energy structure will rest on the non-fossil, coal, oil and gas etc. three pillars

- Non-fossil fuels will have a faster growth, accounting for 25.5% and 35% of the primary energy consumption by 2035 and 2050 respectively.
- The proportion of coal will steadily decline, dropping to 42.5% by 2035 and further to 33% by 2050;
- The proportion of gas will continue to rise, reaching 15% and 17% respectively by 2035 and 2050; the proportion of oil will gradually decrease to 17% and 15% by 2035 and 2050, and the combined proportion of oil and gas by 2050 will account for about 32%.

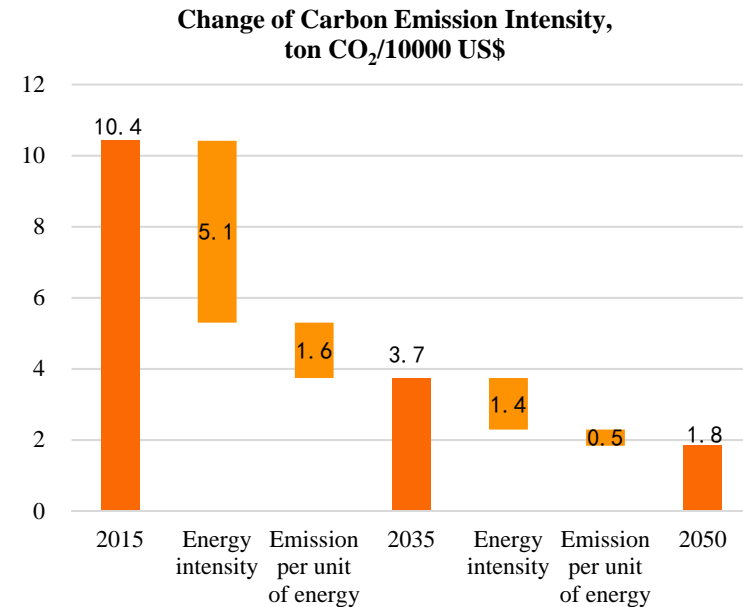
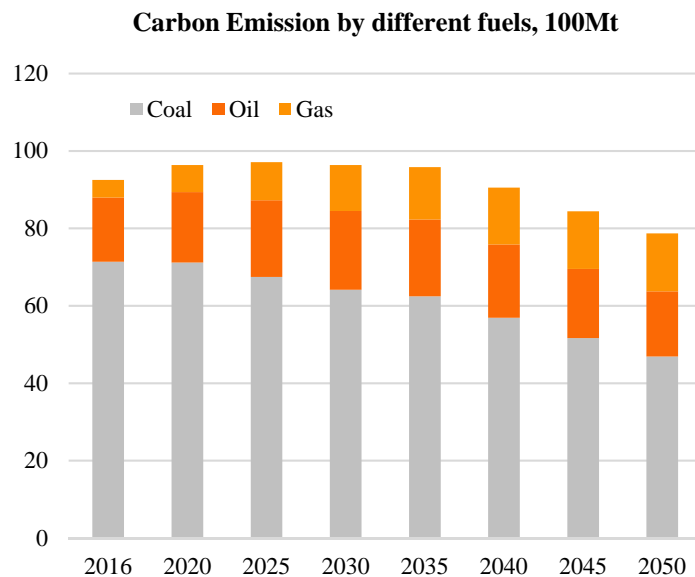






## China's energy-related CO<sub>2</sub> emissions will peak before 2030

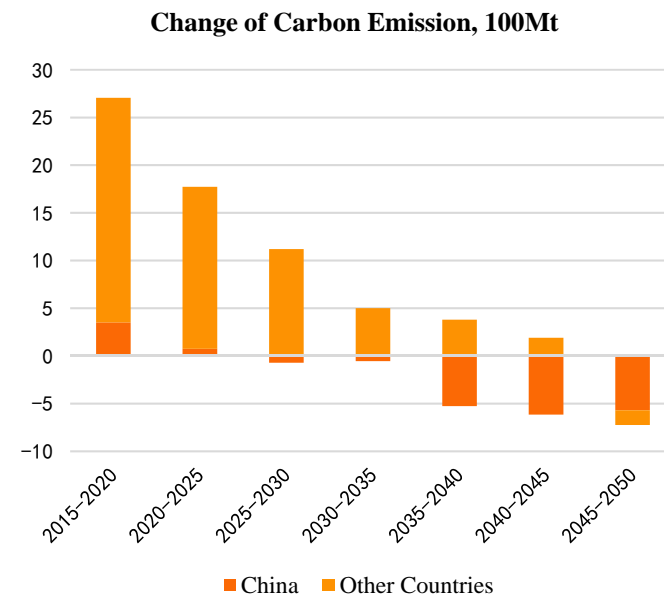
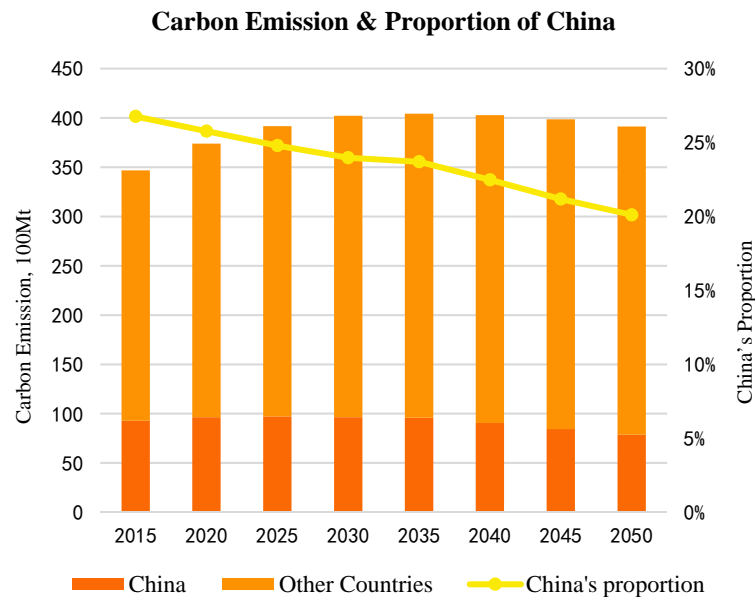
- Energy-related CO<sub>2</sub> emissions will peak before 2030, and then gradually fall back to that in 2010 by 2050.
- Carbon emission intensity will decrease rapidly and drop by 62% and 82% from the level of 2010 by 2035 and 2050 respectively.
- The decline of the energy intensity (energy consumption per unit of GDP) contributes more than 75% to the decline of the carbon intensity.





## The peak of China's CO<sub>2</sub> emissions will lead global emissions peak soon

- As China's fossil energy consumption declines and carbon emissions reach a peak before 2030, energy related CO<sub>2</sub> emissions of China in world's will continue to fall, which will be less than 20% by 2050.
- The peak of China's CO<sub>2</sub> emissions will create a good opportunity for the peaking of global carbon emissions. The change of China's emission will become negative in 2025-2030, which will cause global emissions to reach a peak after 2035.



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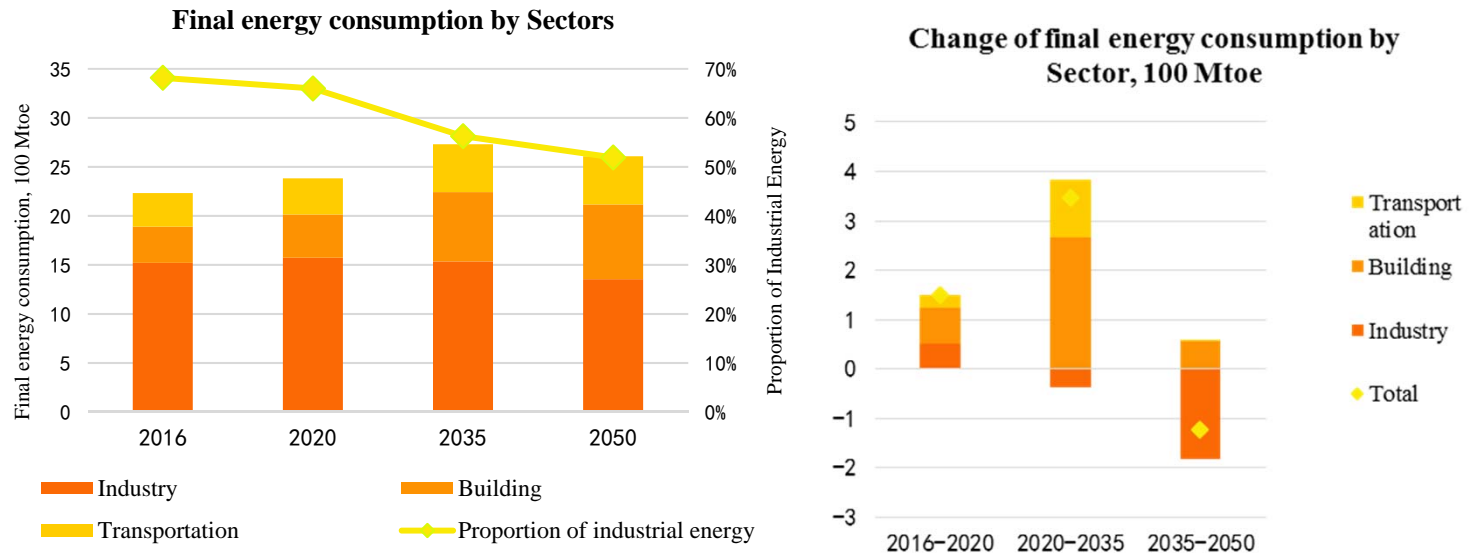
## End-use energy consumption

*BASE SCENARIO*



## The focus of China's energy consumption gradually shifts to the living and consumption sides

- As China's industrialization enters the late stage and urbanization progresses steadily, energy demand will shift from the production side to the consumption side. The proportion of industrial energy to the final energy consumption will fall steadily, while the proportion of building and transportation energy will increase steadily.
- The final energy consumption will reach its peak around 2035, the industrial energy consumption will reach its peak around 2025 and the transportation energy consumption will plateau after 2035. While the building energy consumption (including residential and commercial) is expected to grow before 2050. .

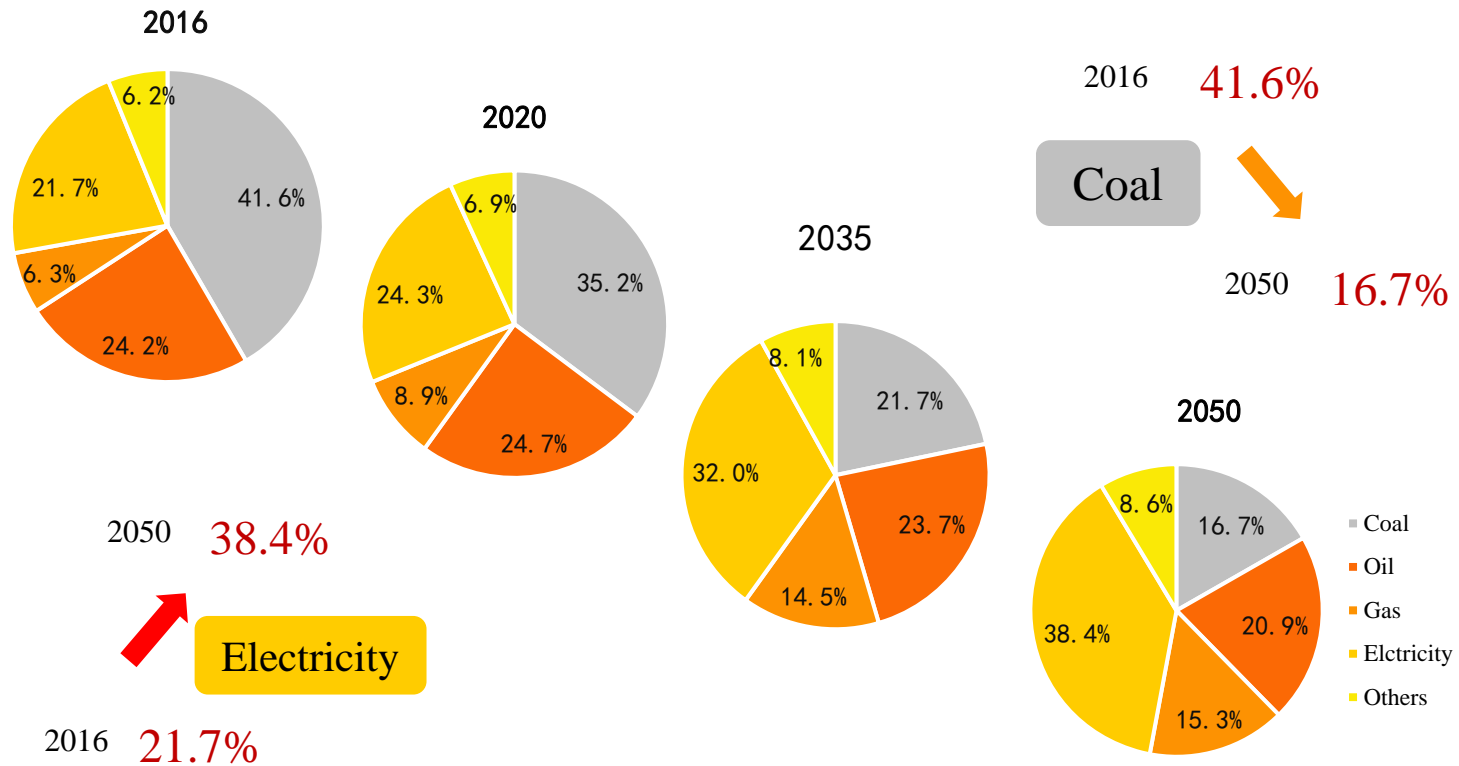


Note: industrial energy consists of combustion energy and non-combustion energy



## The transition from production energy use to consumption energy use objectively requires a cleaner energy structure.

- ⦿ In terms of fuel consumption, the proportion of coal in the end-use sectors will decrease significantly. The proportion of oil products will decrease slightly after 2020, and the proportion of gas and electricity will continue to rise. By 2050, the proportion of electricity to the final energy consumption will reach 38.4%.

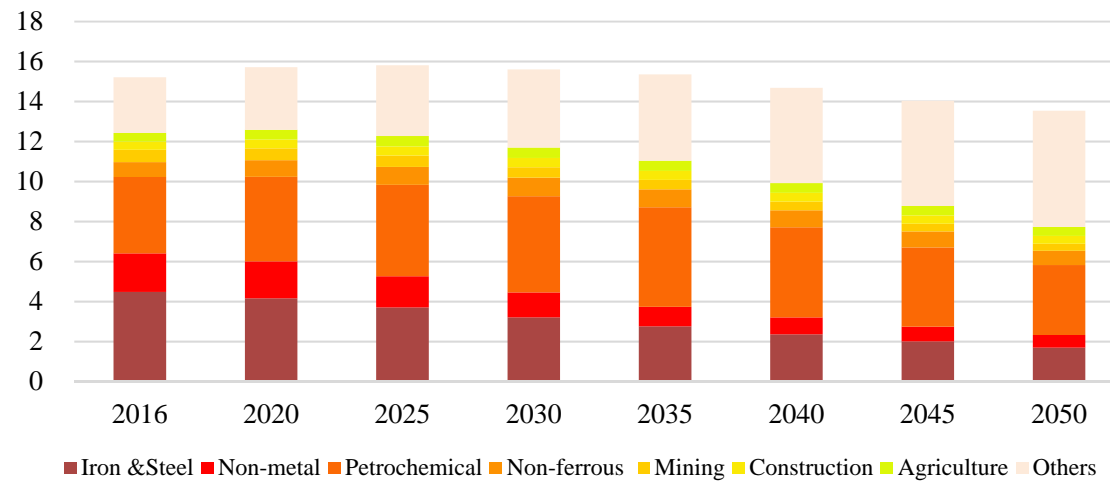




## China's industrial energy peaks around 2025, and high energy-consuming industries account for less than 50%

- Due to the economic restructuring, internal adjustment of the industrial structure and the partial saturation of some high energy consuming products, energy demand of the industrial sector will increase only slightly before 2025, and then start to decline.
- In terms of subsectors, the energy consumption of high energy consuming sectors such as steel and cements will decline steadily. The energy consumption of non-ferrous, construction, and agriculture sectors will peak around 2030, while the petrochemical sector will still grow before 2035 due to the chemical demand growth. The energy use of other industries will continue to grow. By 2050, the proportion of energy use of the energy-consuming industries to the industrial energy use will be less than 50%.

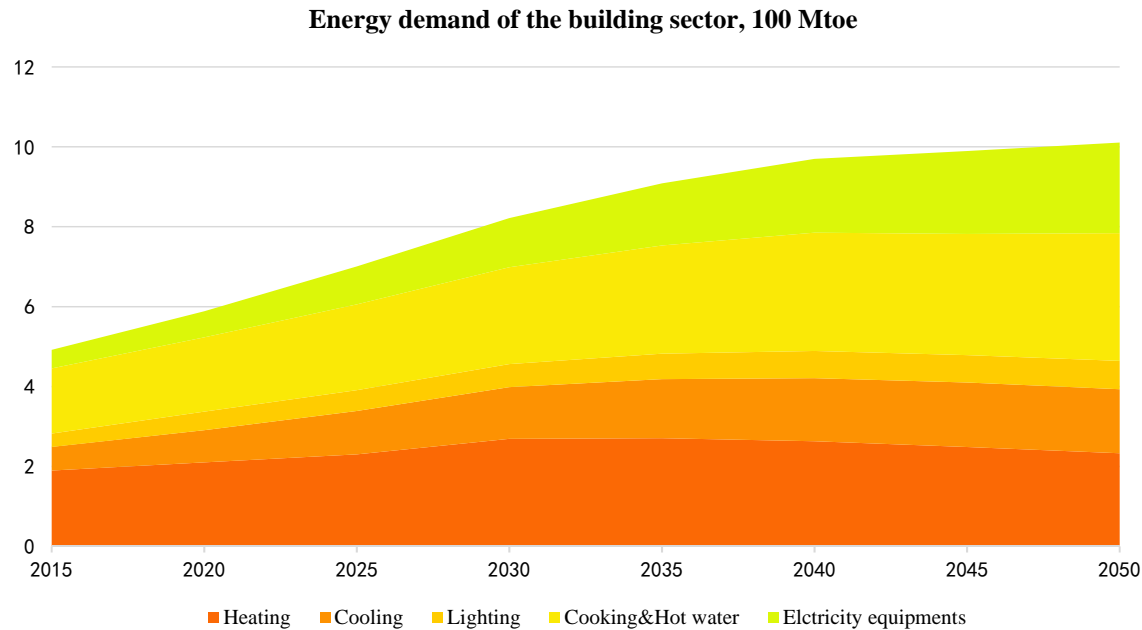
Energy Demand of the Industrial Sector, 100 Mtoe





## Energy demand of the building sector will continue to rise

- With the continuous improvement of people's living standards, continuous progress of urbanization and transformation of economic structure, the energy demand of the building sector (residential and commercial) will keep rising until 2050.
- In terms of subsector's energy demand, the energy consumption of electrical equipments will increase the most before 2050, an increase by 3.9 times by 2050 compared with that of 2015, followed by cooling and lighting, which will increase by 1.7 and 1.1 times respectively.

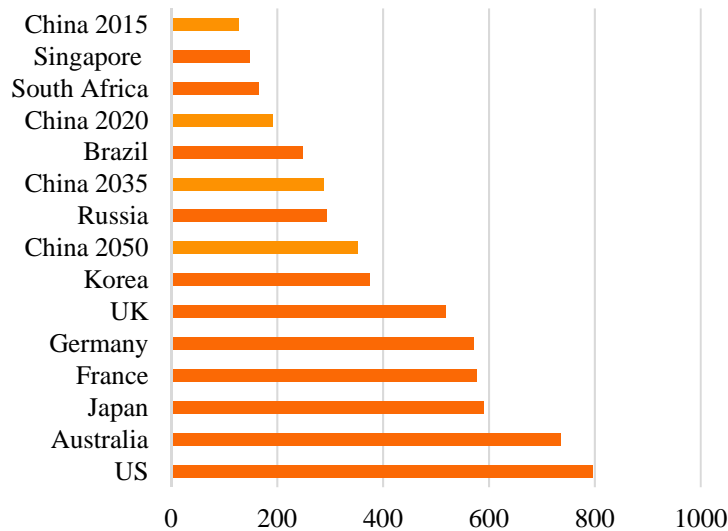




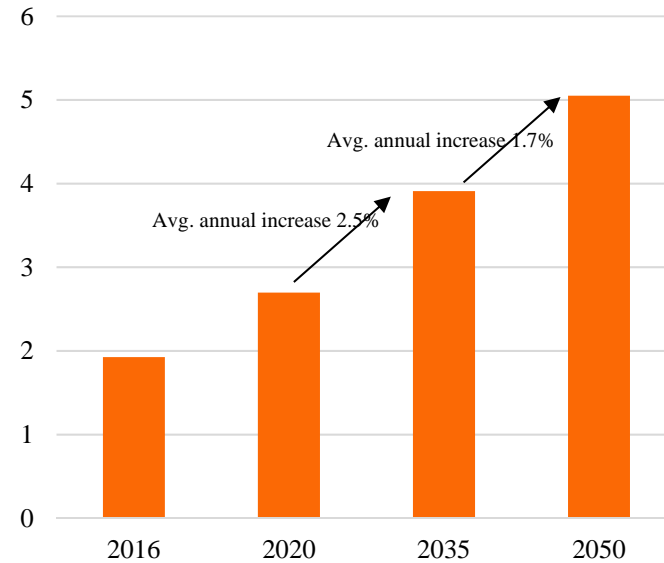
## There is still a large room for China's vehicle population to grow

- The number of autos per 1000 person in China is significantly lower than that of developed countries. In the future, as the income of Chinese residents increases, the demand of convenience and comfort on traveling will increase. The number of autos in China will continue to increase, reaching about 350 vehicles per thousand person by 2050.**
- By 2050, China's vehicle population will reach 500 million, an increase of 1.8 times compared with 2015.**

Number of autos per thousand person in different countries



Vehicle Population, 100M

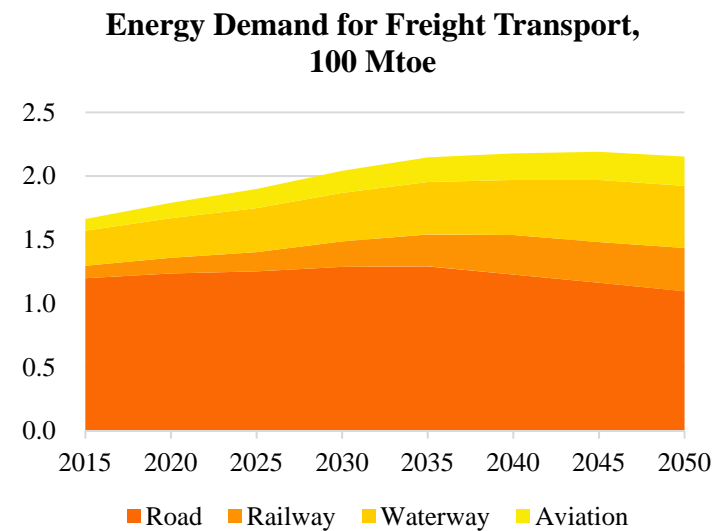
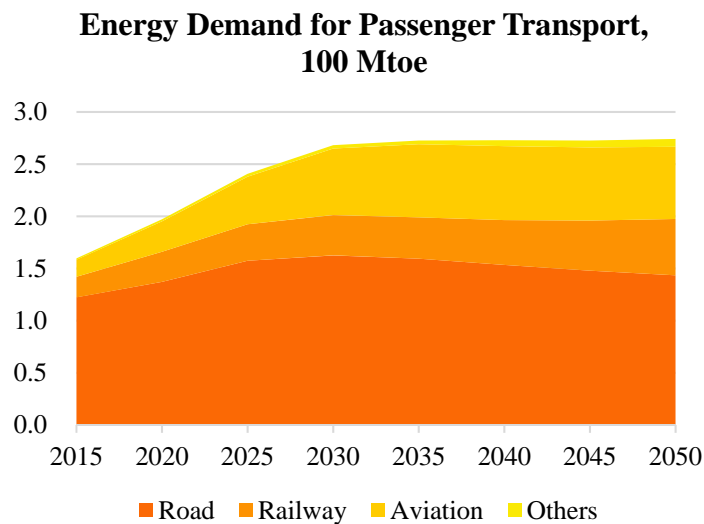






## China's transportation energy will grow fast by 2035, and then will plateau

- Before 2030, with the rapid increase in vehicle population and the rapid increase in long-distance travel and touring demand, energy demand of the passenger transport sector will usher in explosive growth. By 2030, it will reach around 270 Mtoe, an increase of 68% compared with 2015. The proportion of energy used in road transport of the passenger transport sector will continue to decline, only 52.3% by 2050.
- In the context of economic growth, adjustment of China's industrial structure and the increasing timeliness and individualization requirements of enterprises and residents for product demand, there is still some room for growth of freight energy demand until 2035, and it will be stable afterwards. Under the influence of increasing railway and waterway transportation, the proportion of road energy to the freight field will continue to decline.



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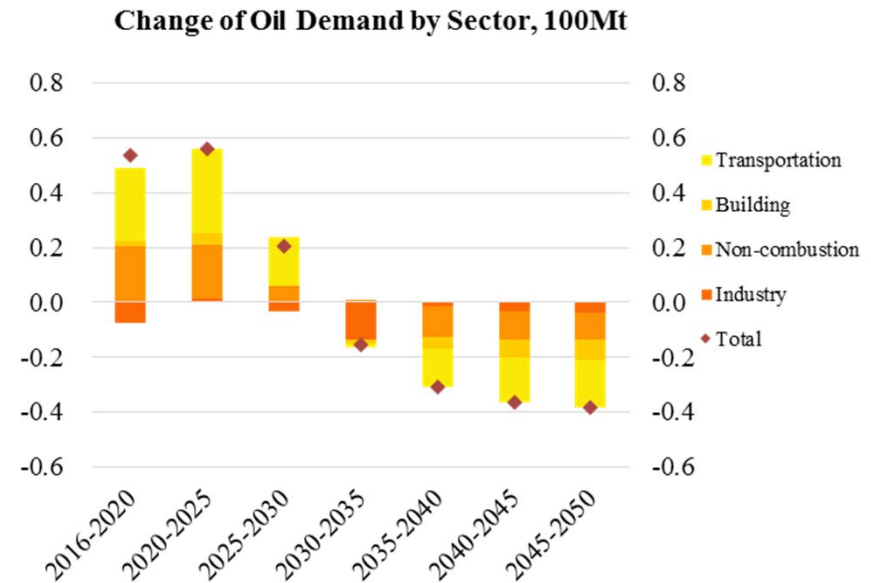
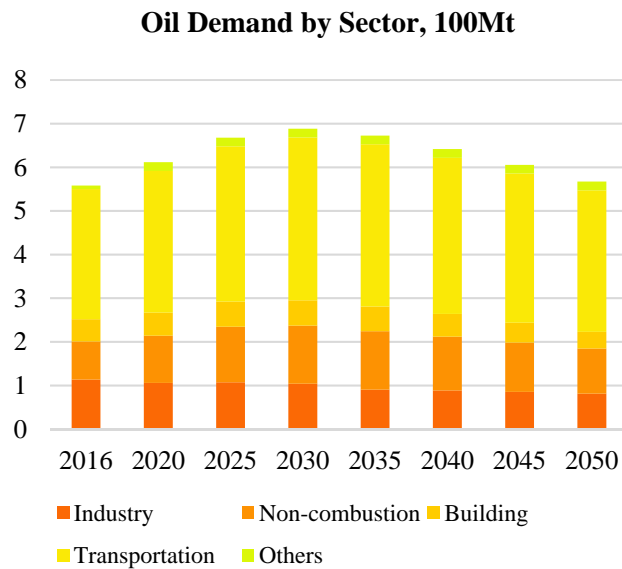
**Oil**

***BASE SCENARIO***



## China's oil demand will peak in around 2030

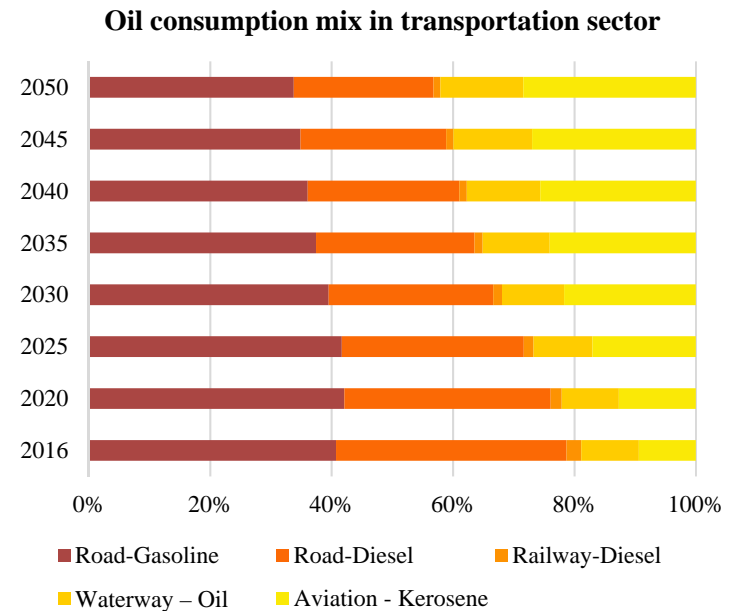
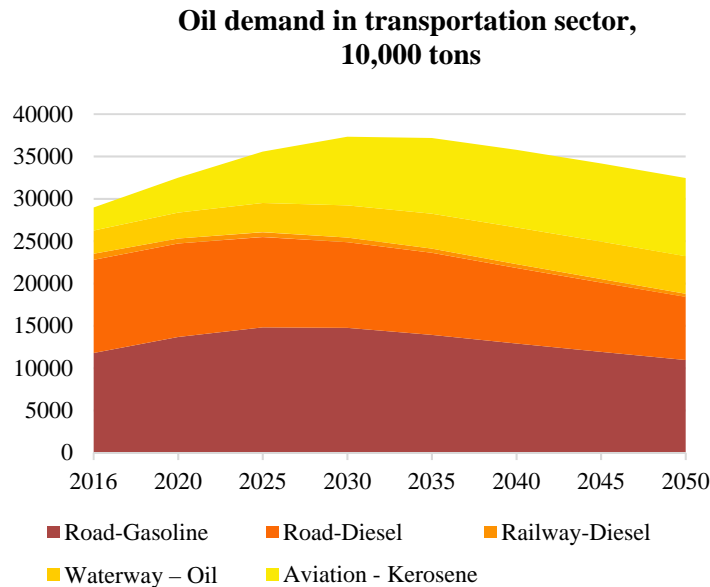
- China's oil demand is expected to reach a peak of 690 million tons by 2030, and then steadily fall back to 570 million tons by 2050.
- Demand growth before 2030 will mainly come from the field of transportation energy and non-combustion, which will contribute 57.6% and 35.1% of the growth respectively.





## Oil used in China's transportation will peak before 2030, and aviation oil is the main growth point.

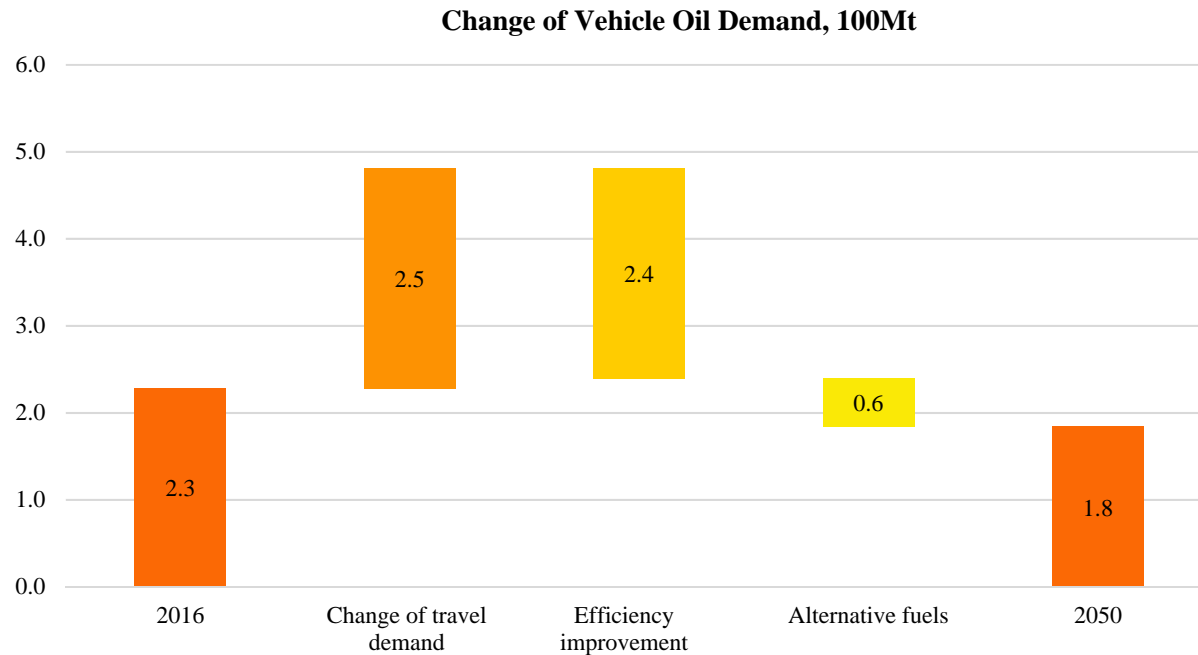
- Due to the transformation of industrial structure and the rapid development of electrified railways, diesel demand of the transportation sector will decline steadily.
- Gasoline demand of the transportation sector will continue to grow until 2025, and will gradually decline due to the rapid development of alternative fuels such as new energy vehicles and ethanols, as well as the continuous improvement of fuel efficiency.
- Air transport will play an important role in long-distance passenger transport and freight transport, and is the main growth point for oil used in the transportation sector.





## Efficiency improvement is the most important factor to promote the decline in demand for automotive oil products

- The more efficient vehicle fuel standards, as well as the continuous development of new energy vehicles and gas vehicles, will make the demand for automotive oil products reduce by 50 million tons by 2050 compared with the 2016.

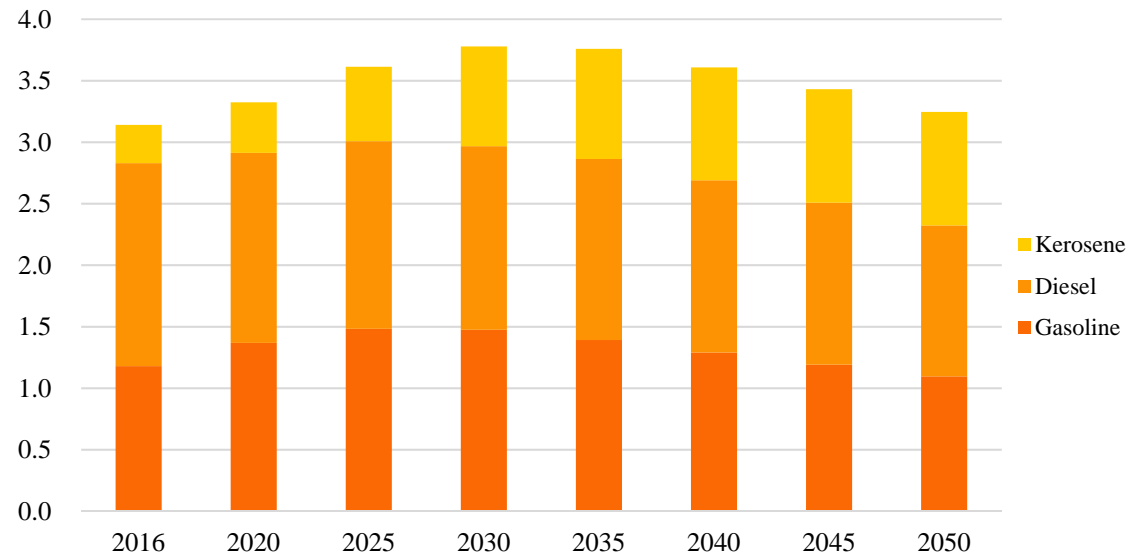




## China's refined oil consumption will reach its peak by 2030

- China's demand for refined oil will peak around 2030, at about 380 million tons.
- Gasoline demand will peak around 2025. Fuel efficiency improvement and rapid development of alternative fuels will drive down the growth of gasoline demand.
- Diesel demand will stay in a peak plateau, and will decrease with the declining of industrial and transportation demands.
- The rapid development of the air transport will drive kerosene to maintain a rapid growth by 2040.

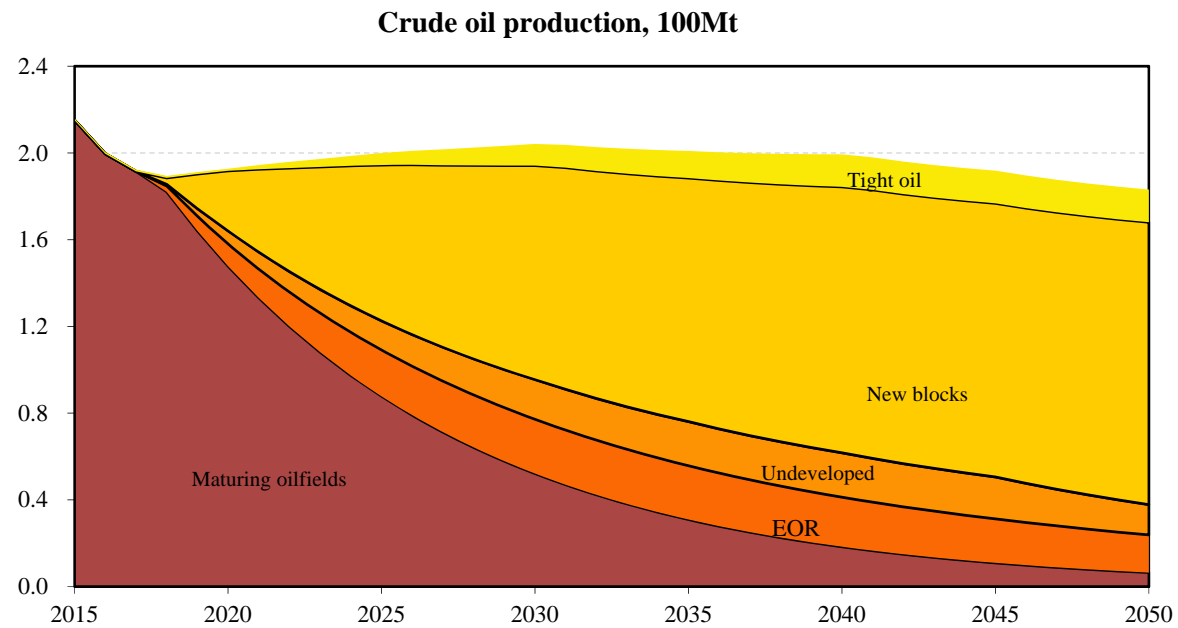
Demand of Refined Oil, 100Mt





## China's crude oil production will remain around 200 million tons

- The rapid increase of new proven reserves, continuous improvement of recovery rate and the increase in unconventional tight oil production are the troikas to ensure the stable domestic crude oil production.

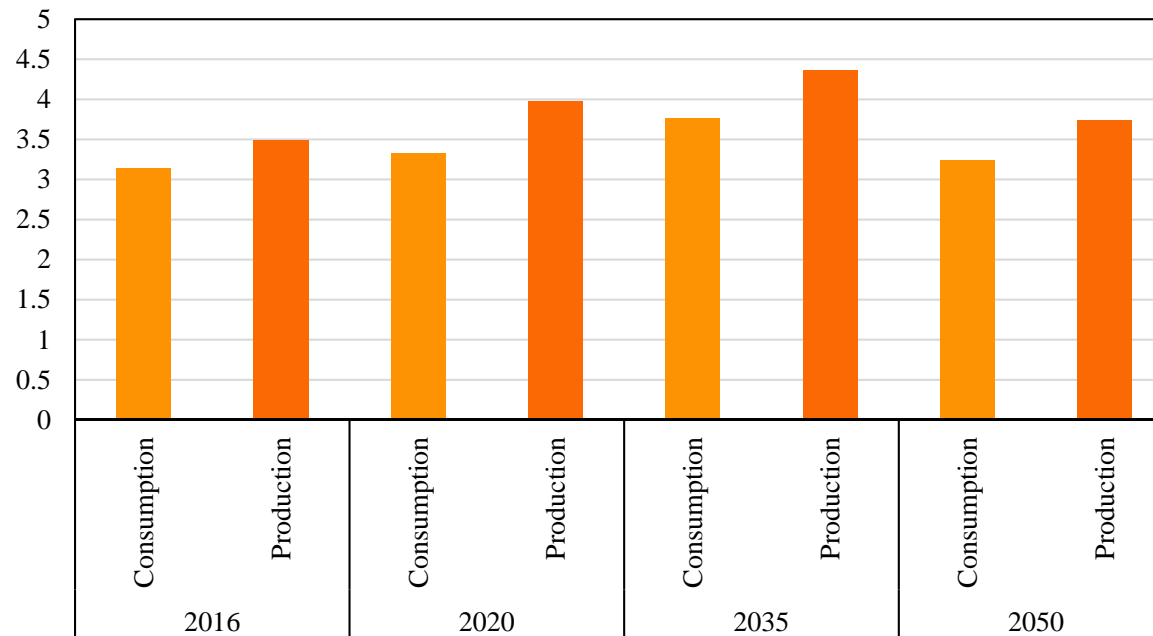




## The supply of China's refined oil is sufficient, showing a loose supply and demand situation

- In recent years, the supply of oil products in China has increased significantly as the concentrated operation of domestic large-scale new refineries. During the outlook period, the supply and demand pattern of refined oil products in China will be generally loose that the supply will exceed the demand by more than 50 million tons.

Demand of Refined Oil, 100Mt





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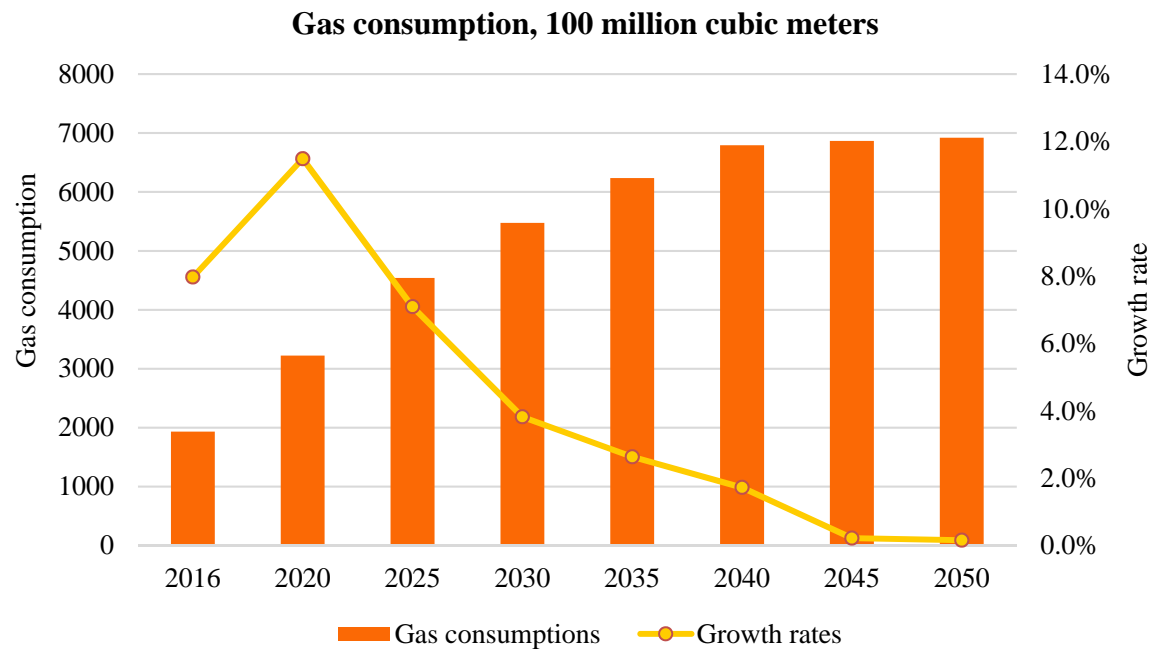
**Gas**

***BASE SCENARIO***



## China's gas industry will be in the golden period before 2040

- With the continued growth of urban population, increasingly improvement of gas pipeline network facilities, China's gas consumption will be in the golden age. The gas consumptions in 2035 and 2050 will be 620 and 650 billion cubic meters, respectively.

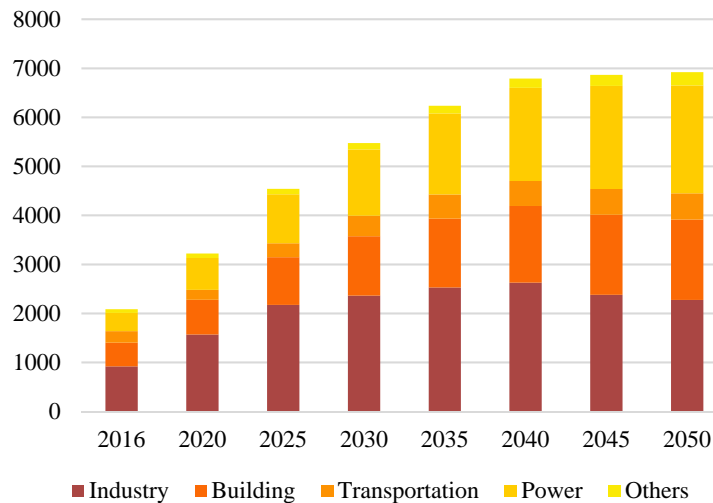




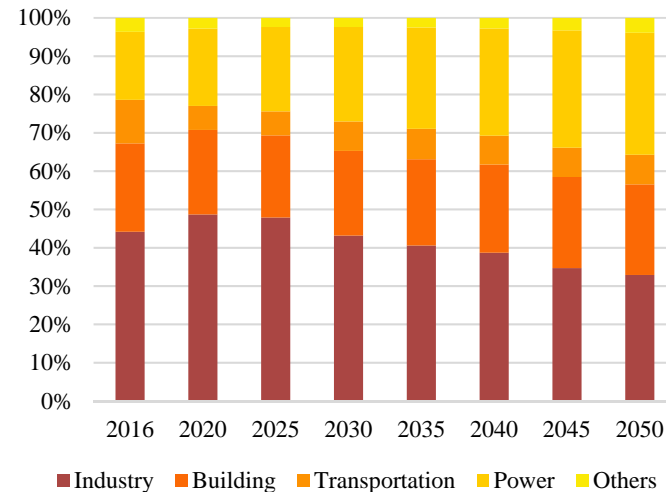
## All sectors are committed to boosting natural gas consumption

- The gas consumption of industrial, residential and power sectors will grow rapidly before 2035, and the average annual growth rate will reach 5.8% in 2015-2035.
- After 2035, especially after 2040, gas consumption of the industrial and residential sectors will be basically saturated and the growth rate of gas demand will also slow down remarkably, the average annual growth rate in 2035-2050 will be only 0.7%.

Gas Consumption by Sectors, 100 M m3



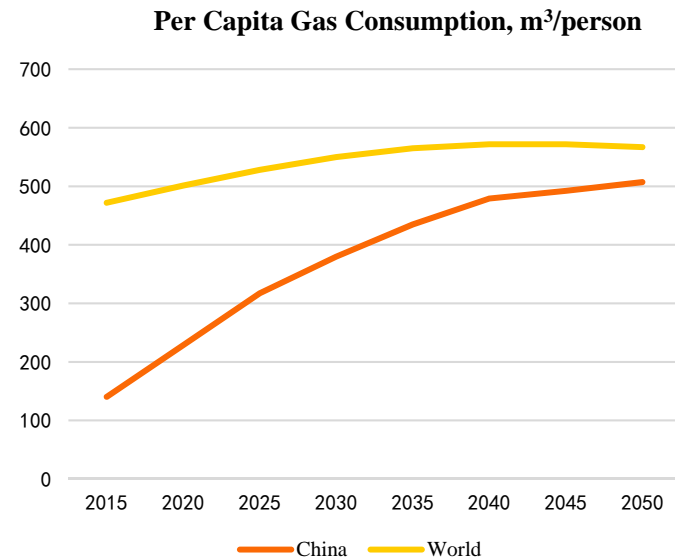
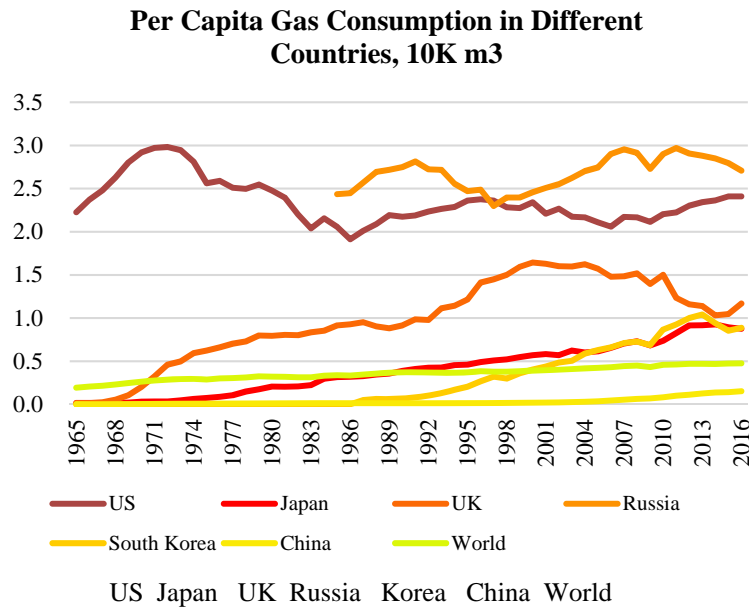
Gas Consumption Structure by Sectors





## China's per capita gas consumption will gradually move closer to the world average

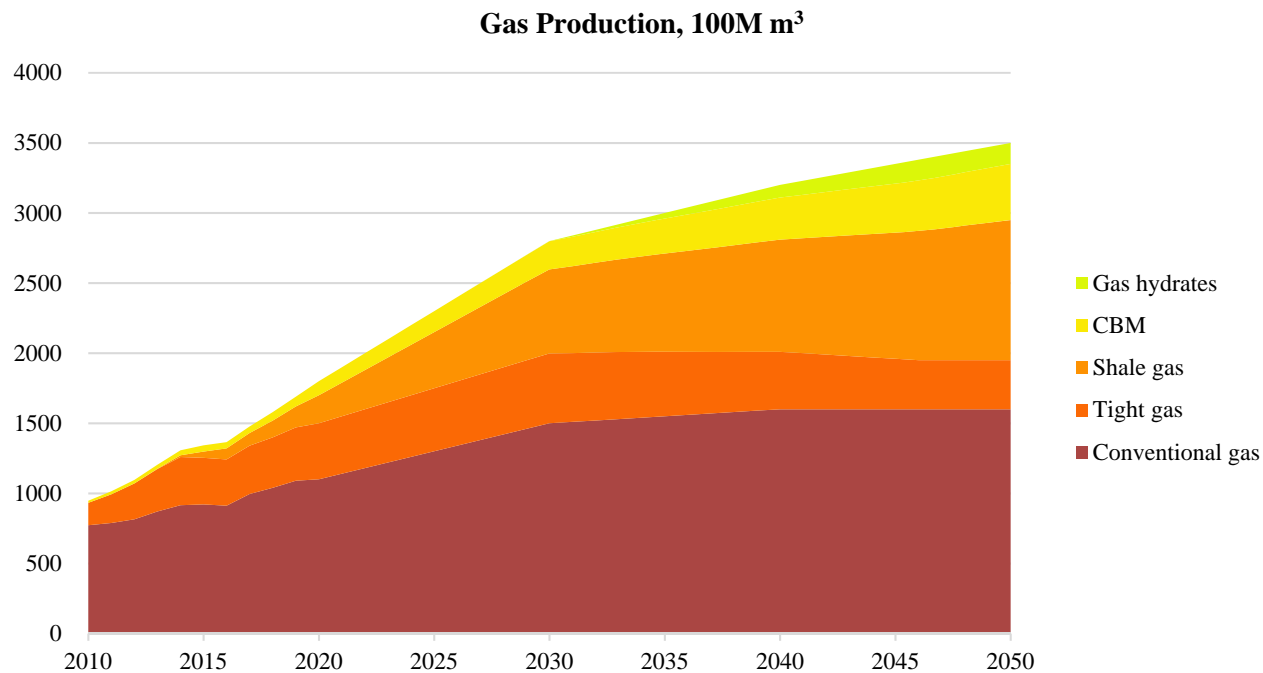
- In 2016, China's per capita gas consumption was only 151 cubic meters per person, far lower than that of developed countries in Europe and America and also lower than the world average of 476 cubic meters per person.
- Gas is clean, low carbon, environmental friendly and efficient and is an important support for the high quality development of people's lives.
- In the future, China's per capita natural gas consumption will continue to grow, reaching 507 cubic meters per person by 2050, which is similar to the world average of 560 cubic meters per person by that time and higher than the current world average of 471 cubic meters per person.





## China's gas production will rise steadily, and unconventional gas will be the main contributor for the growth

- China's gas production will reach 3,000 and 350 billion cubic meters by 2035 and 2050 respectively, with an average annual growth rate of 2.8% during the outlook period.
- Unconventional gas such as shale gas, tight gas and coalbed methane has huge growth potential, which is expected to be equivalent to the scale of conventional gas production after 2035.



6



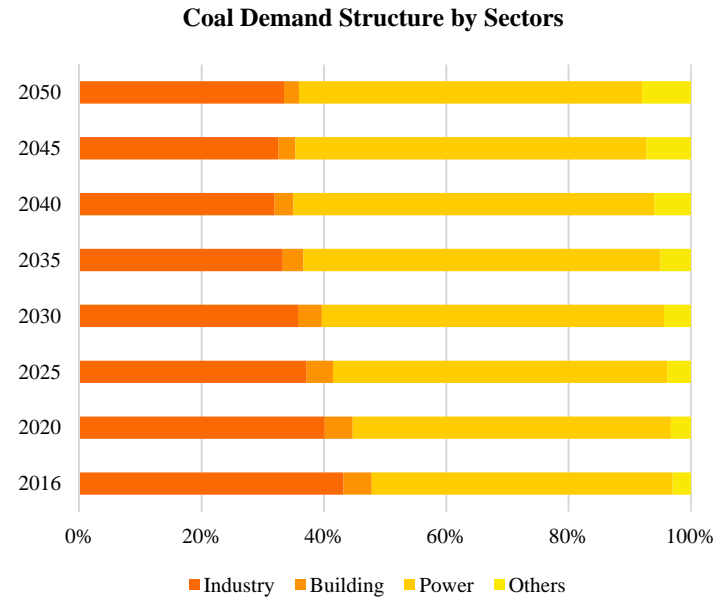
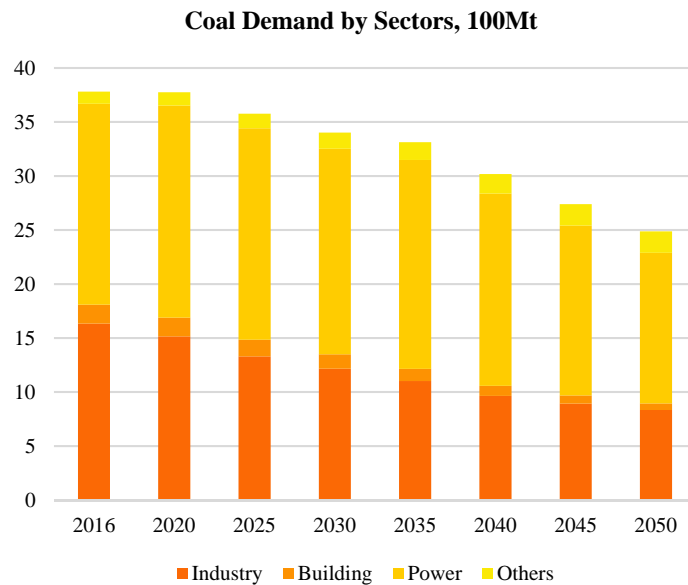
**Coal**

***BASE SCENARIO***



## China's coal demand will decline steadily

- China's coal consumption will decline steadily in the future, only about 70% of that in 2016 by 2050.
- Due to the adjustment of industrial structure, restructuring of industrial and energy structures, the industrial sector will have an average annual decline of 1.75% in 2016-2050.
- The proportion of coal for power generation to the coal consumption will increase steadily by 2035, close to 60% by 2035. After 2035, with the increasing competitiveness of new energy power generation technologies, the demand for coal will decline rapidly.



7



**Electricity**

**BASE SCENARIO**

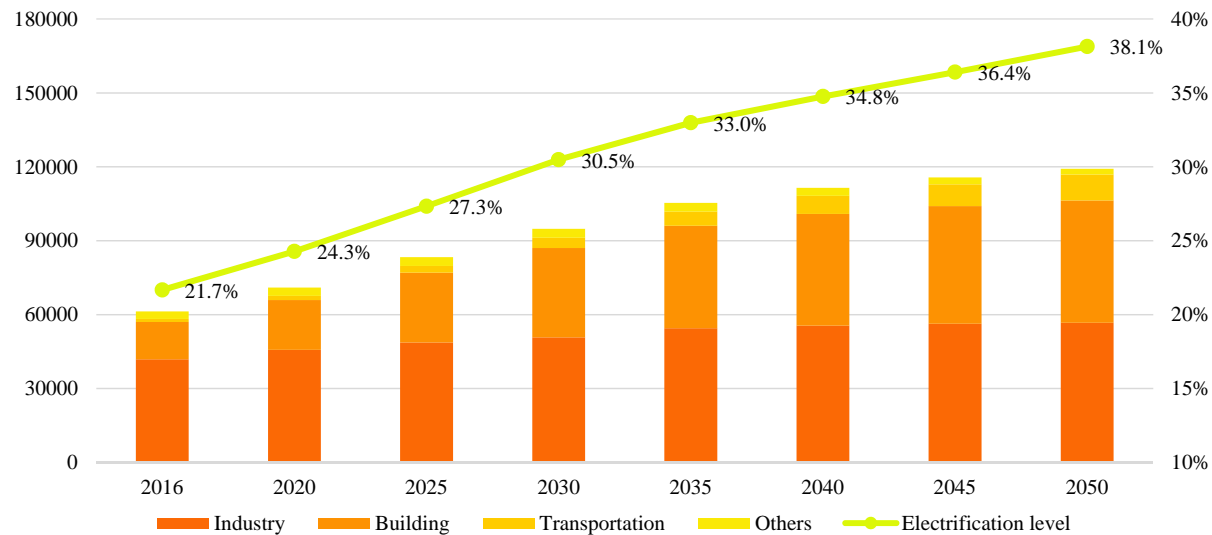




## In line with the future economic and social forms, the level of electrification in China's end-use sectors will improve significantly.

- ④ The electrification level of the end-use sectors will increase to 33% and 38.1% by 2035 and 2050 respectively, while that is only 21.6% in 2016.
- ④ With the improvement of living standards, household power consumption is increasing. At the same time, large-scale applications such as big data and cloud computing have steadily increased the Electricity Demand of the commercial sector. In 2016-2050, the power consumption growth of the building sector will increase with rate 3.6%.
- ④ The Electricity Demand of the industrial sector is growing rapidly due to high-end manufacturing and strategic emerging industries, with an average annual growth rate of 0.78%.
- ④ The transportation sector's power consumption will grow at a high speed under the promotion and popularization of high-speed rail and electric vehicles, with an average annual growth rate of 6.3%.

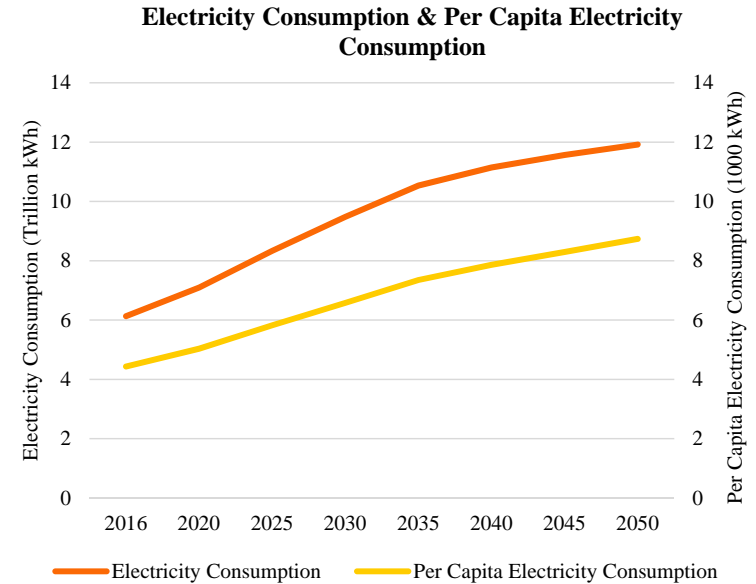
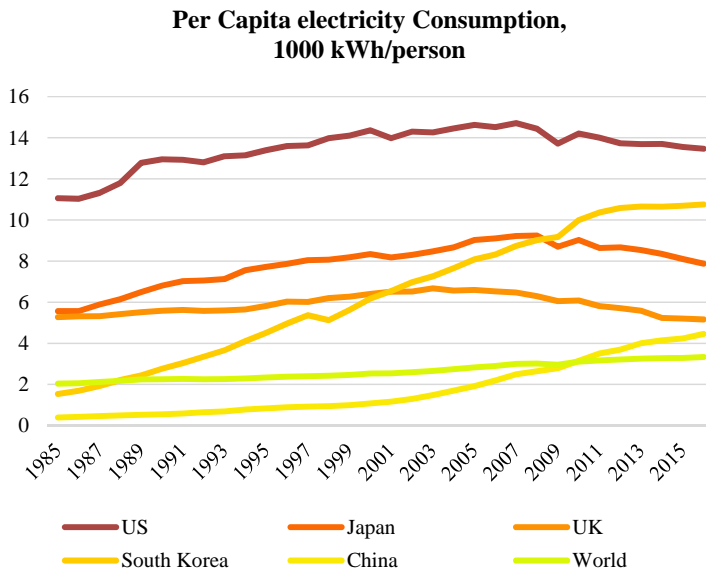
Electricity Demand by Sector, 100M kWh





## China's per capita electricity consumption will be similar to the current developed countries by 2050

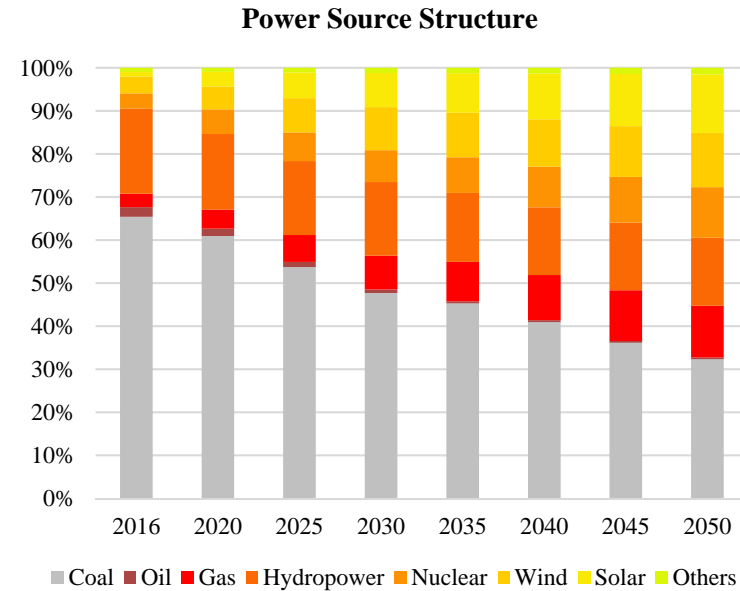
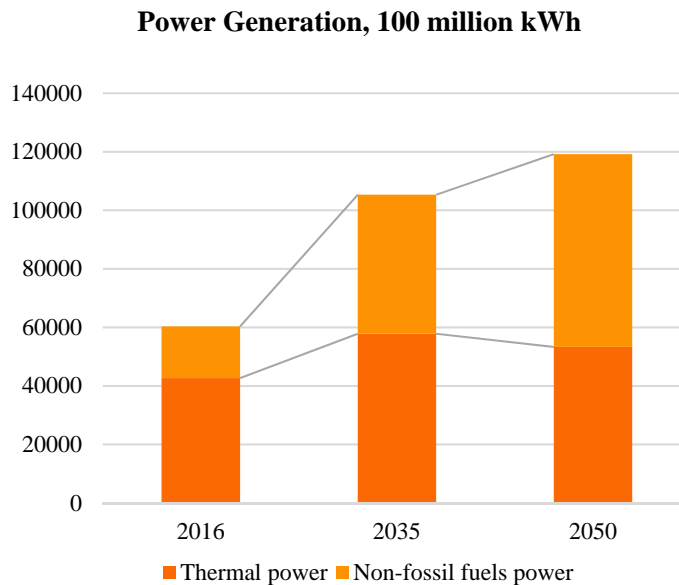
- During the outlook period, China's electricity demand will steadily rise to 11.7 trillion kWh, but the growth rate will be gradually slowing down.
- At present, China's per capita power consumption is slightly higher than the world average, but compared with the United States, Japan and other countries, the gap is still relatively large. By 2050, China's per capita electricity consumption will be close to 9,000 kWh, slightly higher than the current level of Japan, Germany, France and other countries.





## Growth of electricity growth will mainly come from clean energy

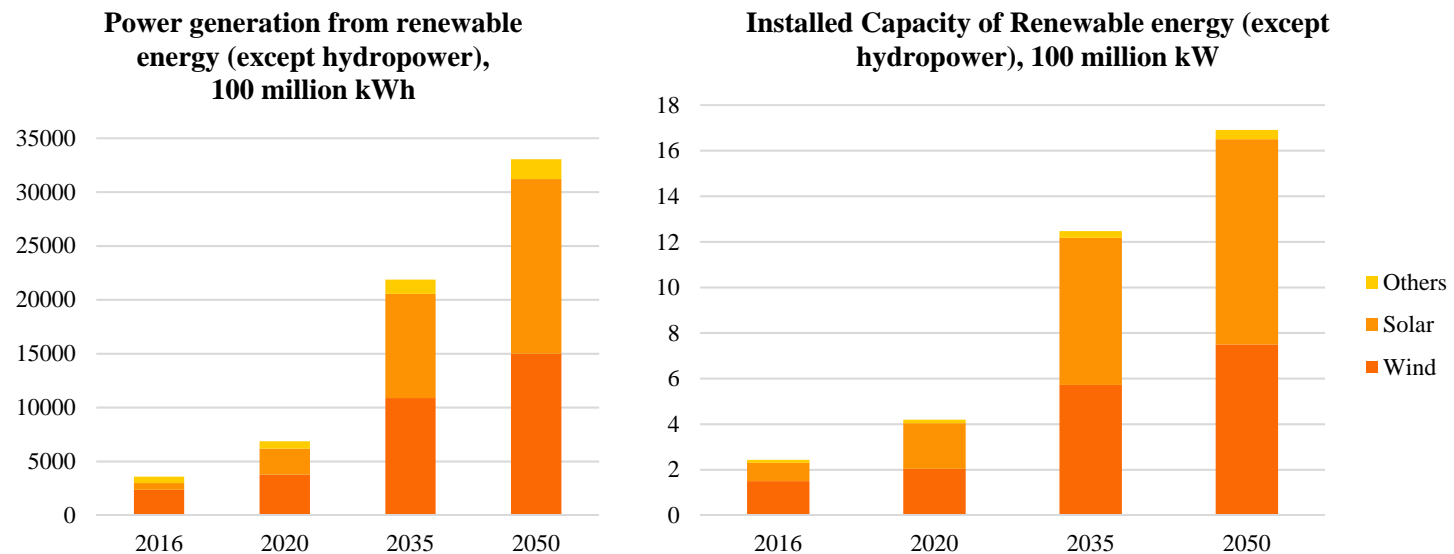
- Driven by climate change, air pollution control and increasing competitiveness of renewable energy technologies, non-fossil fuel power generation will contribute 86.4% of the power generation growth by 2050.
- In the future, the power generation structure will be characterized by diversified and low-carbon. The proportion of coal-fired power will be less than 50% by 2030; the proportion of non-fossil fuel power generation will increase steadily, reaching 43.5% and 55% by 2035 and 2050 respectively.





## China's wind, solar and other renewable energy will maintain rapid growth for a long time

- In the future, the cost of technologies such as wind power and solar energy will continue to decline. In addition, the improvement of absorption capacity of power grids will increase and the rapid development of distributed energy systems will reduce the overall costs of wind and solar power generation. As limited by the stringent supply, external environmental factors, the operating costs of conventional fossil energy resources will continue to rise. At the same time, new energy technologies such as wind and solar will have a stronger positive incentive effect on the employment and economic development, and will promote the rapid development of non-hydroelectric renewable energy.**





## Highlights – China's Energy Outlook

- 1. China's primary energy demand will peak and flattened around 2035-2040, at approximately 5.6 Btce (3.91 Btoe). Due to the rapid optimization of energy structure, energy-related CO2 emissions will reach a peak before 2030.**
- 2. China's energy consumption structure will be characterized by a clean, low-carbon, diversified transition. The transition from old to new energies will continue, and cleaner energy (non-fossil fuels and gas) will meet the incremental demand and optimize stocks. By 2050, the proportion of non-fossil fuels will account for about 35%, basically forming a pattern focusing on coal, oil and gas and non-fossil fuels.**
- 3. Before 2030, oil demand will continue to grow due to the growth of demand from transportation sector and chemical feedstocks. It will reach a peak at around 700 million tons by 2030. In 2016-2030, diesel demand will decline slowly, gasoline demand will increase at first and then decrease, and aviation fuel demand will continue to grow, and the refined oil demand will also reach a peak at around 380 million tons by 2030 .**
- 4. Gas is clean, efficient, low-carbon, easy to use, safe. Its demand will grow steadily during the outlook period, with higher growth rate before 2040. New demand will be concentrated in industrial, residential and power sectors.**
- 5. China's crude oil production could be maintained at around 200 million tons per year by 2030, and then gradually declined. During the outlook period, China's natural gas production will grow at an average annual rate of 2.8%, and will reach about 350 billion cubic meters by 2050 .**
- 6. The increase in China's power generation will be mainly contributed by non-fossil fuels, which accounts for 86.4% of the total power growth during the outlook period; by 2050, the proportion of non-fossil fuels power will reach over 55%.**



## Enhanced Policy Scenario

*Enhanced Policy  
Scenario*



## Scenario Settings

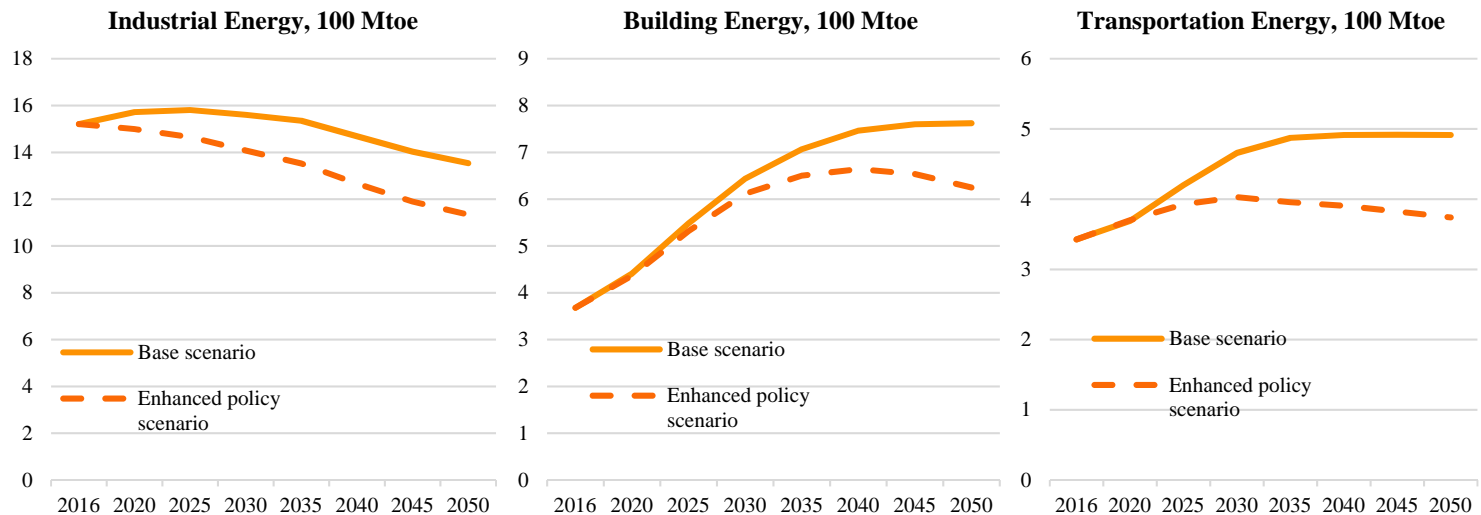
Under the enhanced policy scenario, China pays more attention to the construction of ecological civilization, and the development of high energy-consuming industries is subject to greater constraints. Emerging industries such as the service industry, information industry and high-end manufacturing industry are developing rapidly. On the energy demand side, we should strengthen efforts to constantly improve energy efficiency of all sectors, strive to improve the level of power electrification for terminal use, and take effective measures to practice green production and promote the concept of eco-friendly lifestyle. On the supply side, we implement stricter control policies on fossil energy utilization, and make power generation technologies of non-fossil fuels more competitive through comprehensive measures such as carbon tax, environmental tax, carbon trading and other fiscal instruments, as well as fiscal and tax price systems.

	Base Scenario	Enhanced Policy Scenario
Energy Efficiency	Energy efficiency of industrial sector will increase by 1.5% annually; technology efficiency in transportation sector will increase about 1.5% each year; energy efficiency of construction sector will increase by 1% annually; generation efficiency of thermal power will increase by about 0.5% annually.	Energy efficiency of industrial sector will increase by 2% annually; technology efficiency in transportation sector will increase about 2% each year; energy efficiency of construction sector will increase by 1.5% annually; generation efficiency of thermal power will increase by about 0.6% annually.
Development of Emerging Technologies	Total costs of wind power and solar photovoltaic power generation will be equal to technology cost of coal power before 2025 and 2030 respectively. Energy storage technologies will start to be implemented rapidly after 2030. The cost of electric vehicles is comparable to that of conventional fuel vehicles between 2025 and 2030. Fuel cell vehicles will be competitive around 2040.	Total costs of wind power and solar photovoltaic power generation will be equal to technology cost of coal power before 2020 and 2025 respectively. Energy storage technologies will start to be implemented rapidly after 2025. The cost of electric vehicles is comparable to that of conventional fuel vehicles before 2025. Fuel cell vehicles will be competitive around 2035.
Carbon Emissions Constraints	No	In 2050, it will fall by about 60 percent from 2015 levels



## Improving energy efficiency and reducing energy demand are the foundation of China's energy transition

- Under the enhanced policy scenario, the final energy consumption of the industrial, building and transportation sectors will be significantly lower than the base scenario, with a decline of 16.2%, 18% and 23.9% respectively by 2050.
- Factors that promote the decline of final energy consumption in the end-use sectors are multi-faceted, including the optimization of industrial structures, use of energy-efficient technologies, promotion of green travel and building energy efficiency standards.

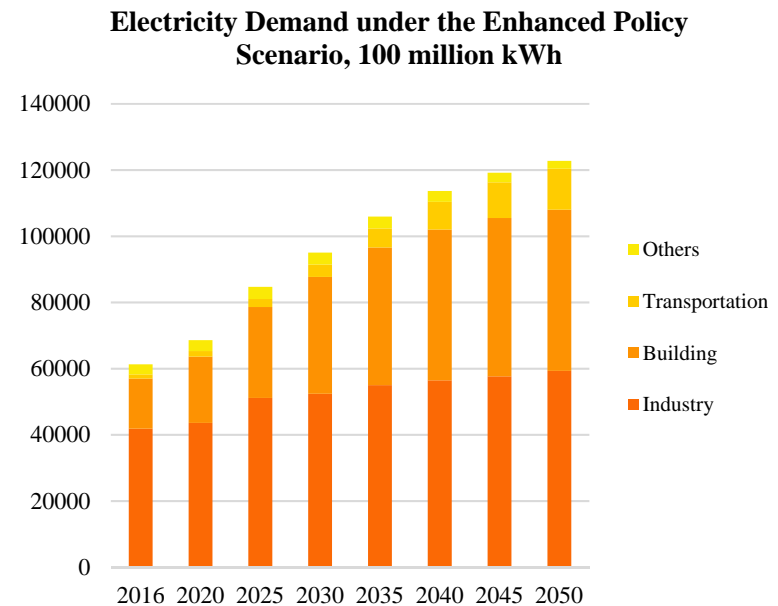
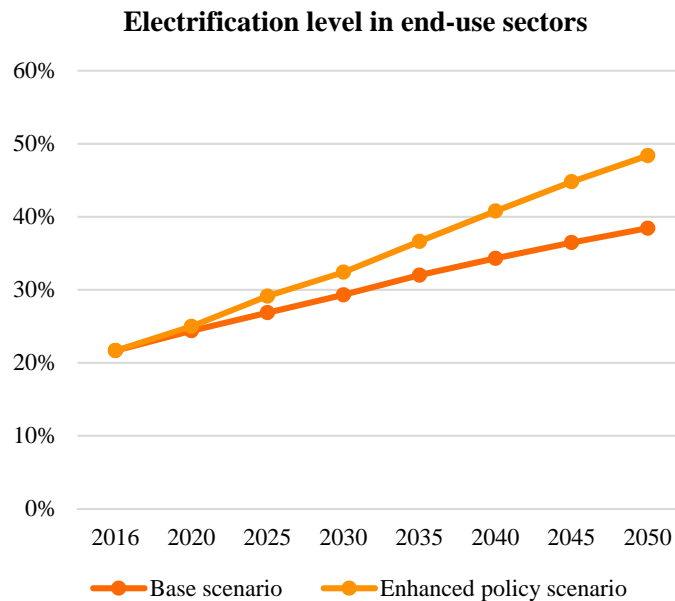






## Improving the electrification level is an important means of energy saving and emission reduction in China's end-use sector

- As the main carrier of cleaner and low-carbon energy utilization in the end-use sectors, under the enhanced policy scenario, the electrification level of the end-use sectors will be further improved compared with the base scenario, reaching 48.5% by 2050, 10% higher than the base scenario.
- Due to the higher energy efficiency level and lower energy consumption in the end-use sectors, although the electrification rate of end-use sectors increases rapidly, the power consumption will be only slightly higher than the base scenario, which will be 12.3 trillion kWh by 2050.

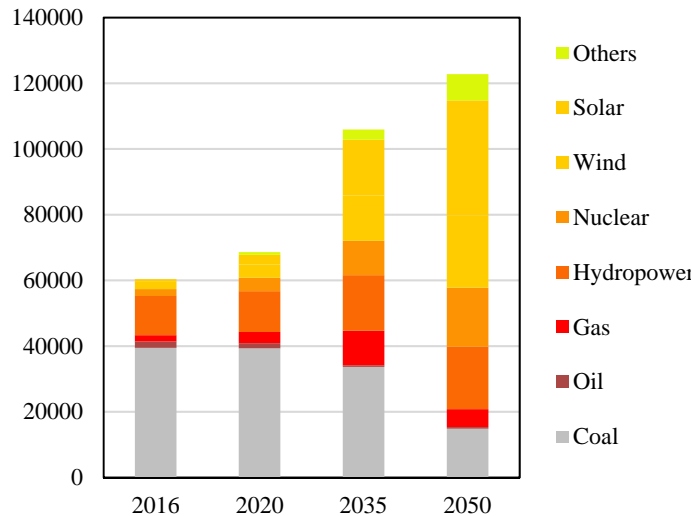




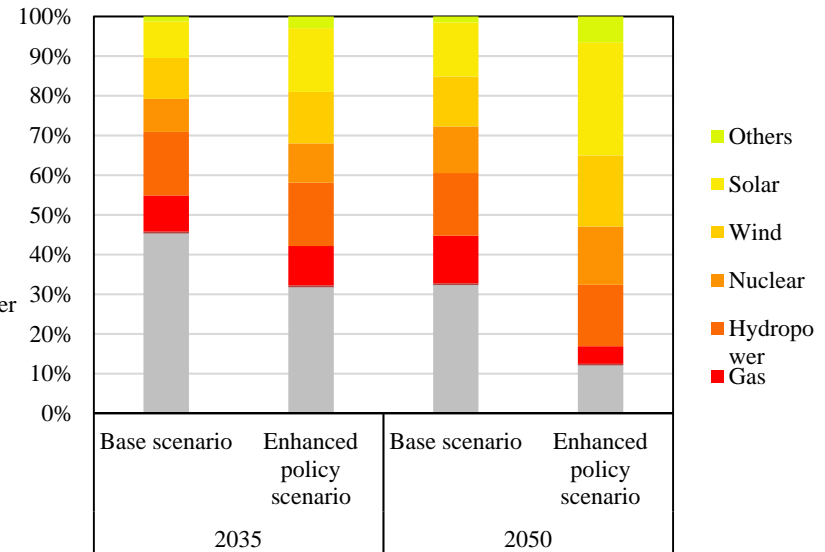
## The transformation of power sector will be the main focus of China's energy transition

- Under the enhanced policy scenario, the power sector will be characterized by significant use of non-fossil and renewable energies. By 2050, non-fossil fuels power will account for 85%, and non-hydroelectric renewable energy power will account for 54.1%.
- The transformation of the power system not only requires breakthroughs in the power generation technologies, but also requires the coordinated development of new technologies and new models such as energy storage technology, smart grid, Internet of energy, multi-faceted energy complementary systems and distributed energy systems.

Power Generation under the Enhanced Policy Scenario, 100 million kWh



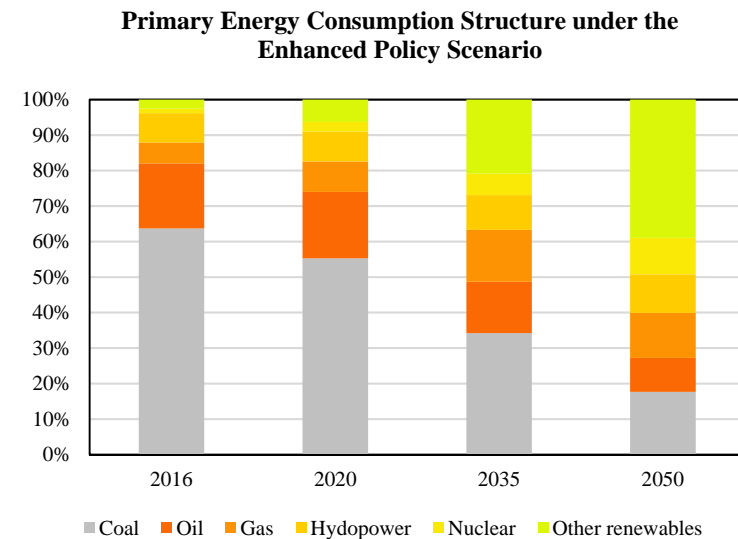
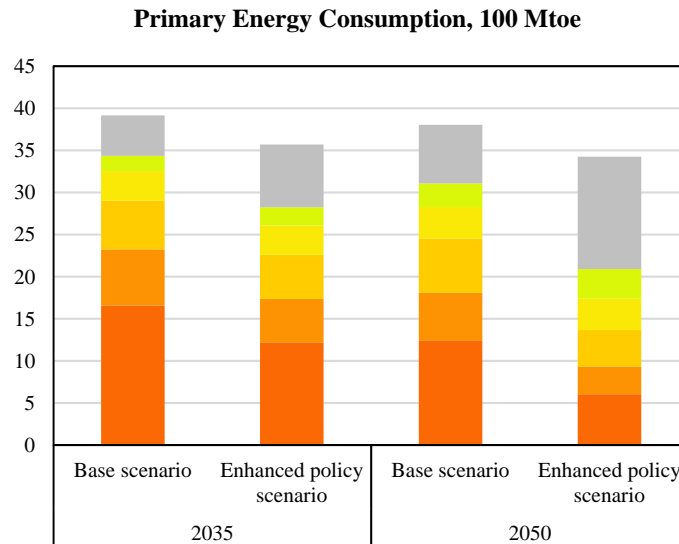
Power Generation Structure





## China's energy system will change revolutionarily under the enhanced policy scenario

- Under the enhanced policy scenario, China's total primary energy consumption will be lower than the base scenario, with a decline of 8.8% and 9.9% over the base scenario by 2035 and 2050 respectively. The primary energy consumption structure will be more inclined to low carbon and diversified: by 2050, the proportion of coal, oil, gas and non-fossil fuels will be 17.6%, 9.6%, 12.7% and 60.1% respectively.
- Under this scenario, oil and gas consumption will decline over the base scenario, which will be respectively 42.5% and 24.5% lower than the base scenario by 2050.

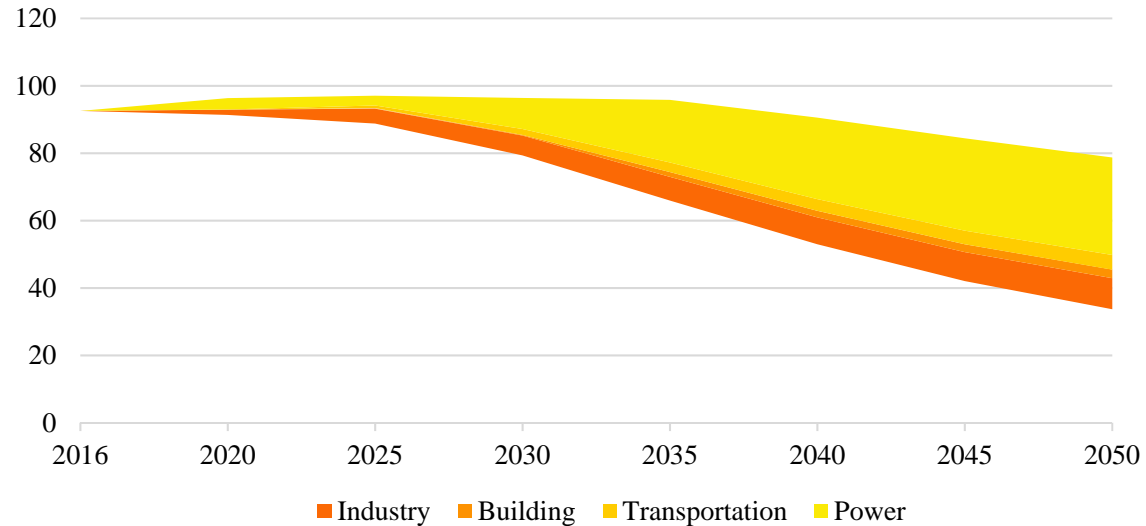




## China's carbon emissions are significantly reduced, and the power and industrial sectors contribute most

- Under the enhanced policy scenario, China's CO<sub>2</sub> emissions will be basically stable by 2020, and then continue to decline. By 2050, it will be only 3.27 billion tons, decreased by 64.7% over 2015, mainly due to the decline in total energy consumption and great development of the non-fossil fuels.
- In terms of sectors, the emission reduction rate of the power and industrial sectors will contribute the major parts, with an contribution rates of 61% and 25% respectively.

Enhanced Policy Scenario V.S. Base Scenario for Emission Reduction, 100 million tons





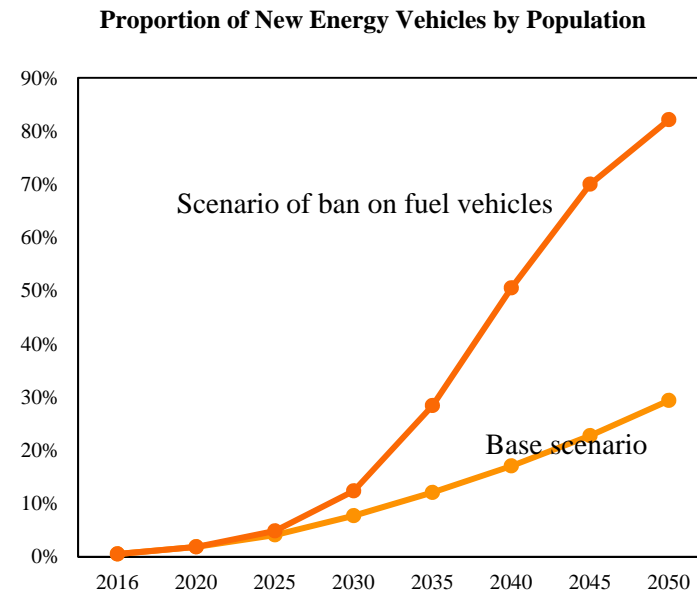
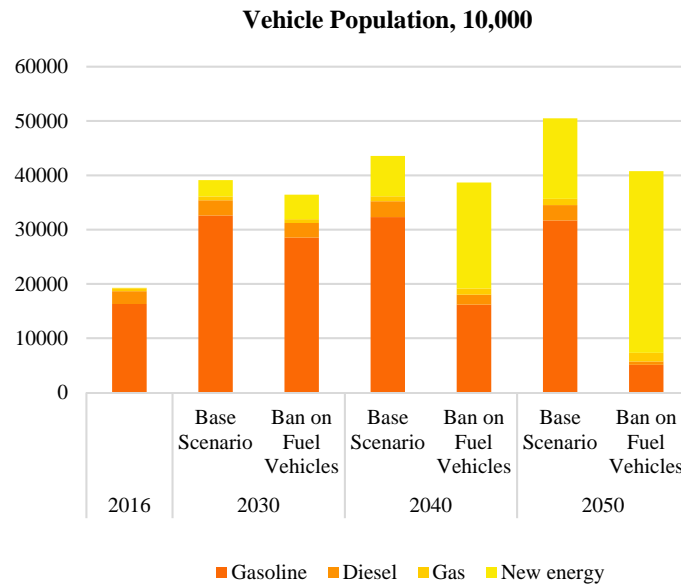
## **Results of Different Scenarios**



## Scenario of ban on fuel vehicles by 2040

The policy of ban on fuel vehicles will revolutionize the vehicle population and structure

- If China bans the sale of fossil-fuel vehicle by 2040, with consideration of the feasibility of policy change, the automobile ecology will undergo tremendous changes since 2030. As stimulated and benefited by the policy, new forms and new modes such as shared travel and driverless driving will flourish. The total demand of cars needed to meet the travel needs of the masses will be lower than the base scenario, and new energy vehicles will be able to develop rapidly, accounting for more than 82% by 2050, 23% higher than the base scenario.**

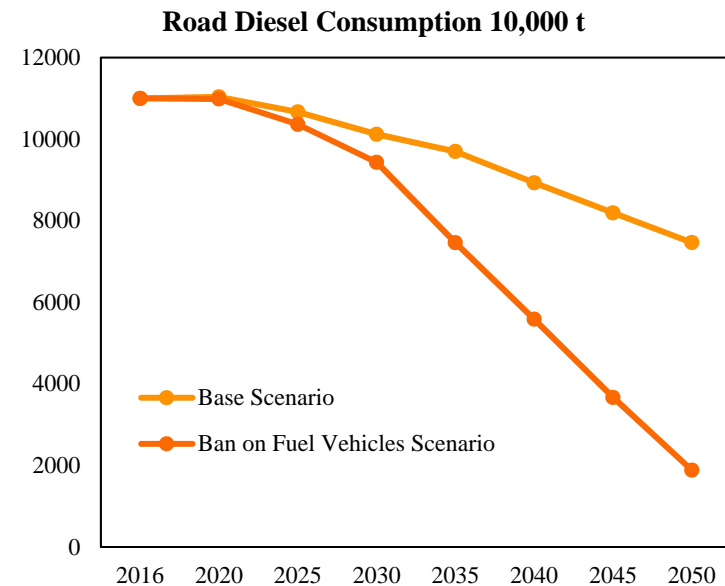
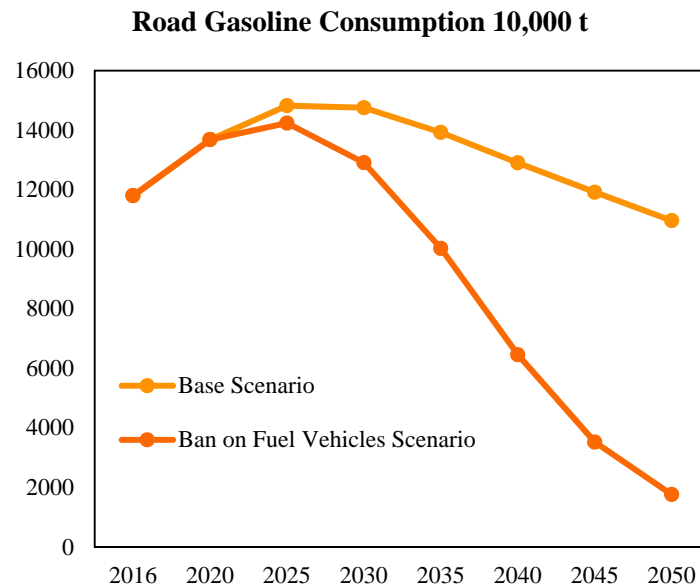




## Scenario of ban on fuel vehicles by 2040

The policy of ban on fuel vehicles will significantly reduce road gasoline and diesel consumption

- The policy of ban on fuel vehicles will greatly reduce the number of fuel vehicles in China and significantly reduce the demand for oil in the transportation sector. By 2035 and 2050, the consumption of gasoline and diesel will be reduced by 0.6 billion tons and 150 million tons respectively compared with the base scenario, a drop of 25% and 80%.

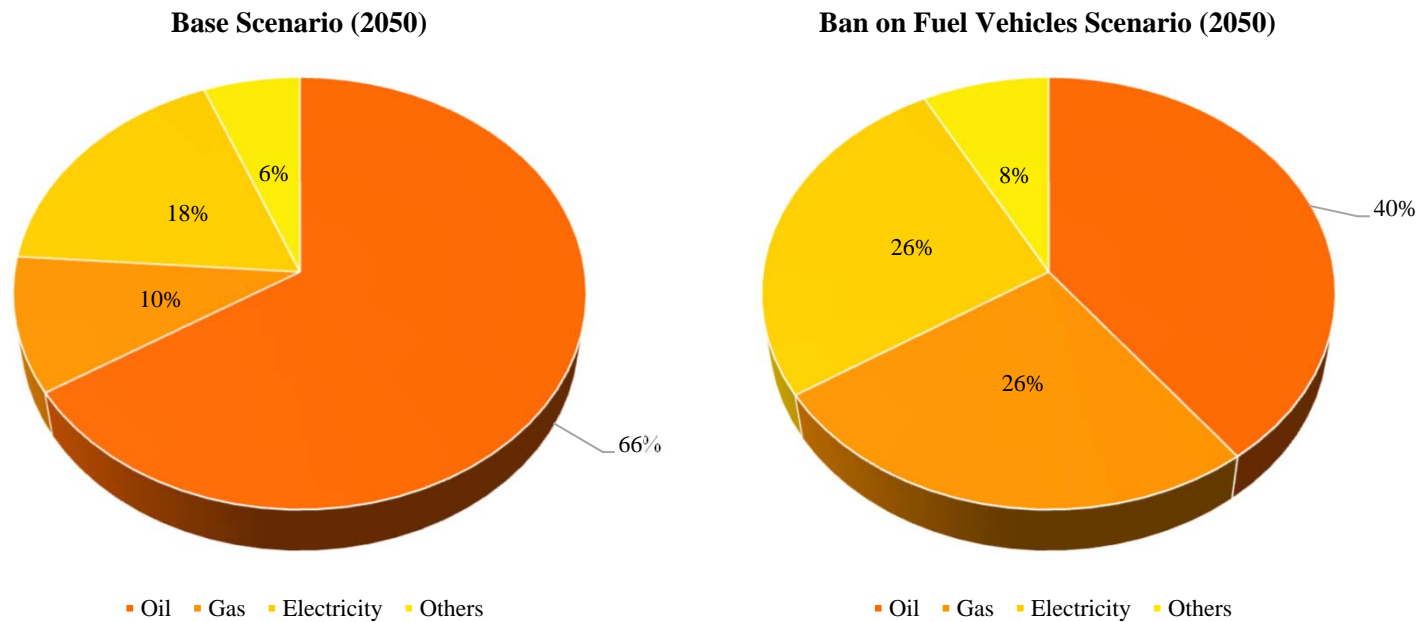




## Scenario of ban on fuel vehicles by 2040

The ban on fuel vehicles will reshape the transportation energy structure

- The policy of ban on fuel vehicles will significantly change the energy structure of China's transportation sector. The proportion of oil products to the transportation sector will be significantly lower than the base scenario. By 2050, the proportion of oil products under the policy of ban on fuel vehicles will be less than 40%, 26% lower than the base scenario. Consequently, the proportion of electric power and gas will increase significantly.





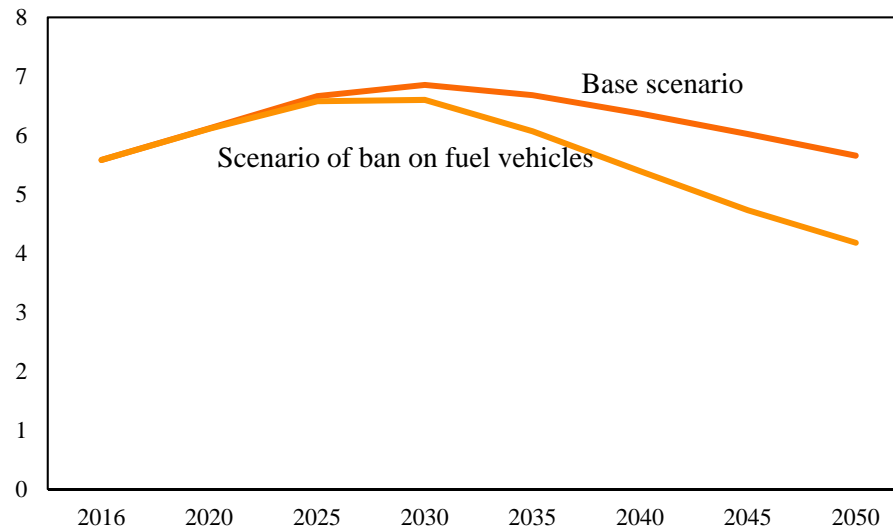


## Scenario of ban on fuel vehicles by 2040

The Oil consumption will decrease dramatically

- The Oil consumption in this scenario in 2035 and 2050 are 0.61 and 0.41 billion tons, which is lower than 0.06 and 0.15 billion ton compared to those in the base scenario.

Oil consumption, 100 million ton





# Thanks!