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# Strategy of Low-Carbon Development in 12<sup>th</sup> FYP and Low- Carbon City Construction in China

Dr. Zhou Jian

Institute of Energy, Environment  
and Economy, Tsinghua University

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清华大学能源环境经济研究所  
INSTITUTE of ENERGY, ENVIRONMENT and ECONOMY  
TSINGHUA UNIVERSITY

# **1.China is not only subject to the constraints of domestic resource endowment and environmental carrying capacity, but also confronted with the challenges associated with climate change and CO2 emissions mitigation during her rapid industrialization and urbanization.**

- During the period of rapid industrialization and urbanization, the GDP from high energy-intensive industries accounted for a big proportion in China, due to the construction of infrastructures and expansion of the production capacity. The demand for energy services is increasing rapidly. China is confronted with severer challenges and bottlenecked obstacle on energy resource security and environmental capacity.
- The demand of energy increases by 200 million tce annually in the recent years. More than 50% of the oil is imported. Although the emissions of the conventional pollutants, such as SO<sub>2</sub>, decrease year by year, the total amount still exceeds the environmental capacity.
- Exploring low-carbon development pathway is the key for China to deal with the rapidly increasing demand for energy and address climate change





## 2.China's actual situation and the development stage she stays result in that China has more difficulties than developed countries in addressing climate change and achieving low carbon development.

- China has made significant efforts in energy conservation and efficiency improvement to achieve the greatest progress in energy saving and emission reduction all over the world. However due to rapid GDP growth, the energy consumption and CO<sub>2</sub> emission is large and fast-growing that could not be easily changed. From 1990 to 2009, the GDP energy intensity in China declined by **53%**, accordingly CO<sub>2</sub> intensity declined by **55%**, that is rare all over the world. From 1990 to 2009, the GDP grew by **6.6** times, and the CO<sub>2</sub> emission increased by **3.0**. China's CO<sub>2</sub> emission per capita in 1990 is approximately half the world average and now overshoot.
- On account of big steps forward in energy technological changes, energy efficiency increased rapidly , with the rate of 1%-2%, but as a result of the rapid development of heavy chemical and high energy intensive industries in recent years, the share in the national economy has continued to increase or remain high, which offset or slowed down the GDP energy intensity reduction.
- China's renewable and nuclear energy development is remarkable, the share of which in primary energy mix keeps increasing, but still could not meet the new incremental demand for energy services in quite a long time, consequently coal and other fossil fuels consumption will continue to grow.



### 3. Notable results achieved through the 11<sup>th</sup> FYP, but the growing trend of energy consumption and CO<sub>2</sub> emission continues

- During the 11<sup>th</sup> FYP, energy intensity decreased by 19.1%, saving energy 770 million tce on a year-to-year basis. CO<sub>2</sub> intensity decreased 20%, achieving CO<sub>2</sub> emission reduction 1.8 billion ton.
- 2010 energy consumption reached 3.25 billion tce, increasing 37.7% compared to that of 2005, with an average growth rate of 6.6%, energy consumption elasticity coefficient 0.59.
- Total energy consumption surpassed the US counterparts. 75% of the world's coal consumption increase and 60% petroleum imports increase were from China
- CO<sub>2</sub> emission per capita reached more than 5tCO<sub>2</sub>, surpassing the world's average. The annual increase of CO<sub>2</sub> emission amounted to about half of the world's increase.
- The 11<sup>th</sup> FYP shifted the trend of growing energy intensity during the 10<sup>th</sup> FYP. However, resource constrain might make the situation worse in the 12<sup>th</sup> FYP.
- Transition of development pattern and controlling on fast-growing trend of total energy consumption will be the key measures to achieve Scientific Development and Green, Low-Carbon Development in the 12<sup>th</sup> FYP.



## **4. Developing green economy and implementing low carbon development is the way to correspond the economy, society and resource/environment and achieve sustainable development.**

- The fulfill the target of controlling the temperature rise by 2 °C, all the countries in the world will face the challenge of the lack of the emission space in there sustainable development. Developing low carbon economy is the way to correspond the economy, society and resource/environment and achieve sustainable development.
- China adhere to the basic national policy of energy conservation and environmental protection, and build “A Resource-conserving, Environment-friendly Society”, in order to ensure the energy security and protect environment. These policies are synergetic and consistent to the target of GHG mitigation and addressing global climate change.



## **5. In the 12<sup>th</sup> FYP, the development mode must shift from the invest-and-export as the dominant driving power mode and GDP growth needs to be moderately controlled.**

- According to the World Bank's statistic, China's capital formation accounted for 43% of China's GDP. The world's average is 22%; the average of middle income countries is 30%. Family consumption accounted for 37%; the world's average is 61% and the average of middle income countries is 50%.
- China's export accounted for 20.1% of GDP in 2000 and 32% in 2008. Import and export rose from the 8<sup>th</sup> place to the world's second place and its share of the world's export increased from 3.9% to 9.6%.
- The fast growth of investment accelerated the infrastructure construction, capacity expansion and high-quality industry development, however, it is not good for industry structure change and energy intensity decrease.





## **6. The 12<sup>th</sup> FYP is a crucial period for China to change its development mode, appropriately control its GDP growth rate, decrease energy intensity, accelerate energy structure shift and realize its energy consumption control goals.**

- China's GDP share of secondary industry (47%) and the share of heavy industry in industry sector (71%) both reached or passed the peak of developed countries during their industrialization period. Steel, cement and other heavy energy consumption products amounted to half of the world's production. (18% and 34% respectively in 2020). This could meet the development needs of industrialization and urbanization. Under appropriate economic development rate (8-9%), the production capacity will be saturated during the 12<sup>th</sup> FYP. Industrial structure change will make a bigger effect on energy saving.
- China's 12th FYP will focus on development mode change and there is a possibility that China's energy consumption could be controlled to around 4 billion tce.
- Limiting investment growth scale and controlling GDP growth rate could optimize industry structure, increase non-fossil energy share, lower energy intensity and control the total energy demand. If the investment share of GDP decrease 1 percentage point and consumption increase 1 percentage point, energy intensity will decrease 0.45 percentage point.



## **7. Provinces and cities that had a rapid GDP growth, should strengthen their efforts in industrial structure change and propose more progressive energy intensity decreasing goal.**

Provinces announced their 12<sup>th</sup> FYP development plans and only Beijing (8%), Shanghai(8%), Hebei(8.5%), Zhejiang (9%) ,Guangdong(8%),Henan(8%) and Shandong(9%), etc have a GDP growth rate lower than 10%. But 13 provinces GDP growth rates are 12% -13%. The trend of relying on heavy industry to expand capacity is apparent for provinces and cities that have rapid GDP growth.

GDP growth rate increases every 1 percentage point on the national basis (8%), energy intensity decreasing goal needs to raise 2-3 percentage point.

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## 8. Provinces and cities that had a rapid GDP growth, should strengthen their efforts in industrial structure change and propose more progressive energy intensity decreasing goal.

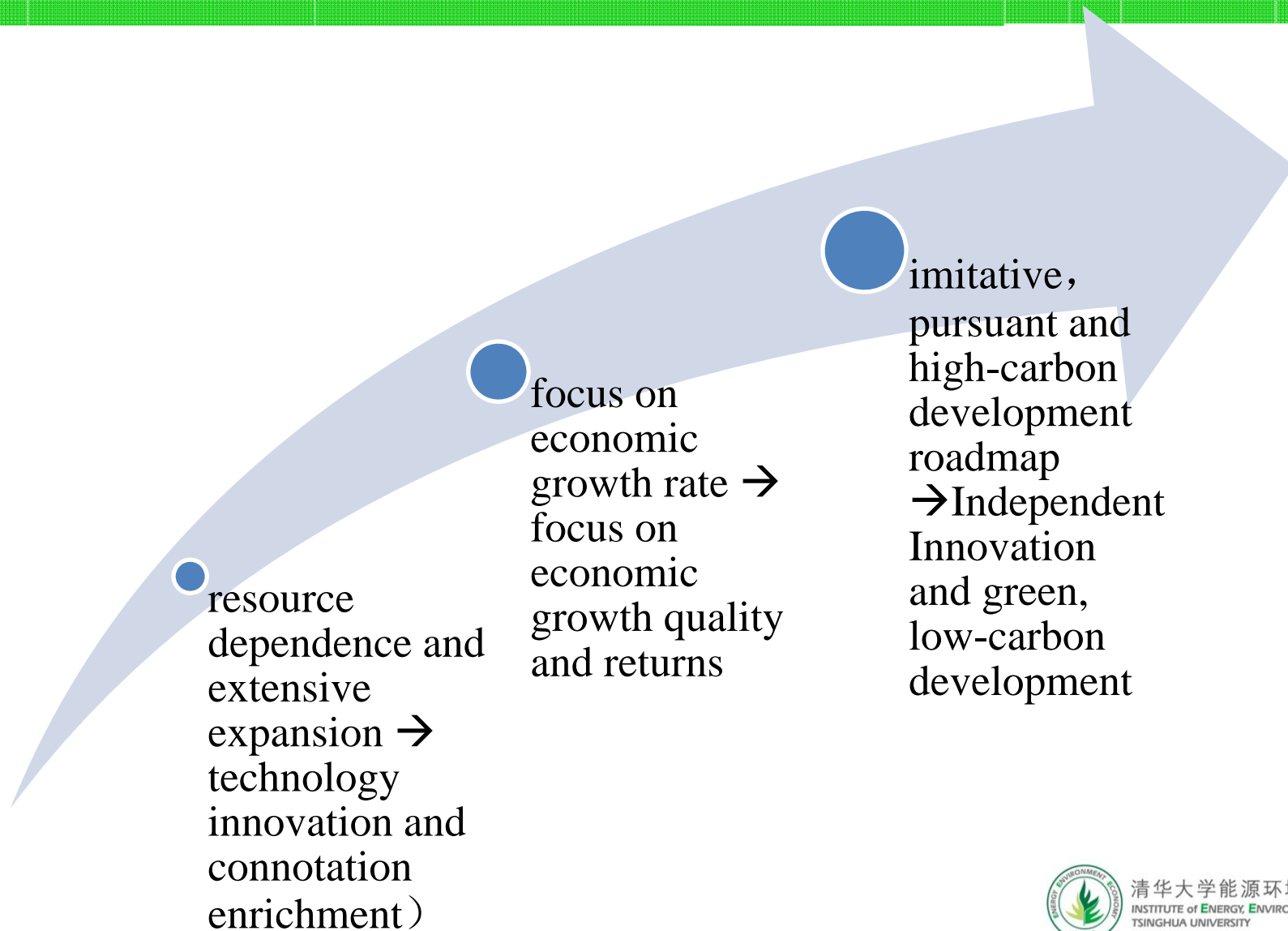
$\varepsilon$ Elasticity Energy demand	“12th FYP” Period GDP annual growth rate				
	7.0%	8.0%	9.0%	10.0%	11.0%
GDP能源强度下降16% Energy intensity decreases 16%	38.3 ( $\varepsilon=0.48$ )	39.9 ( $\varepsilon=0.54$ )	41.8	43.7	45.7
GDP能源强度下降18.5% Energy intensity decreases 18.5%			40.5 ( $\varepsilon=0.51$ )		
GDP能源强度下降21% Energy intensity decreases 21%				41.1 ( $\varepsilon=0.49$ )	
GDP能源强度下降23.5% Energy intensity decreases 23.5%					41.7 ( $\varepsilon=0.47$ )

To Realize Energy Demand Control Goal:

- Further reinforce energy intensity decreasing level;
- Moderately control GDP annual growth rate



## 9. Realize development mode change towards green and low-carbon development under a relatively lenient environment ( I ).



## 9. Realize development mode change towards green and low-carbon development under a relatively lenient environment ( II ).

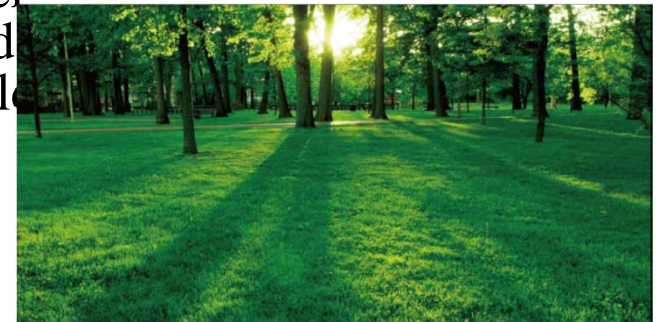
- Try to achieve development mode change in the next 10-year period and realize green, low-carbon and sustainable development and make the foundation for future quantifiable emission reduction obligation.
- To strengthen the industrial structure restructuring, give a full play to the role of energy saving of structure in the 12<sup>th</sup> FYP. In the Scenario of GDP growth rate (  $> 8\%$  ) and GDP energy intensity decreasing target ( 16% ) , the required energy savings should more than that in the 11<sup>th</sup>.





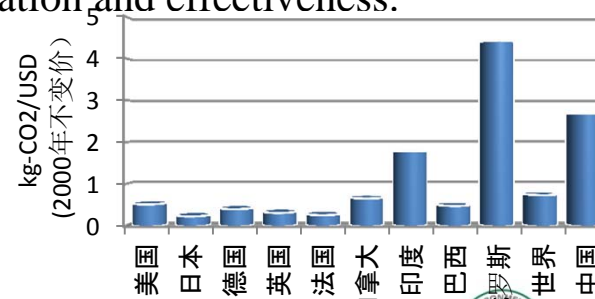
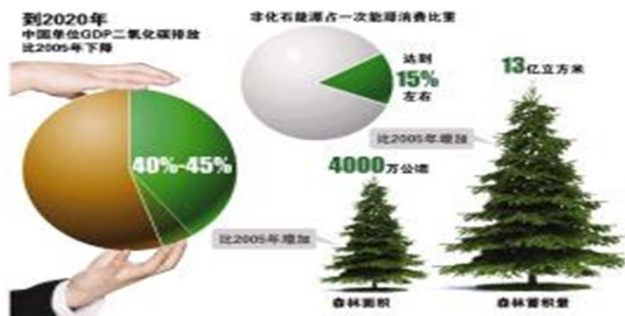
## 10. Pursuing an innovative industrialization trajectory and building low carbon city are China's rational and strategic choice for well coordinating domestic sustainable development and addressing global climate change.

- Climate change will greatly compress global emissions space in the future, China can no longer follow the high energy consumption in developed countries to support the modernization, and should shift to low carbon development pattern.
- Cities and metropolitans are the center of the social and economic development and the main area of GHG emissions. The urbanization should consider ecological civilizations as a purpose, be harmonized with ecological environment. Low-carbon should be one of the most important concepts and characters in city construction
- There are 5 provinces and 8 cities in China pursuing low carbon provinces and cities, which is a strategic measures of building both material civilizations and ecological civilizations, and achieving sustainable development and addressing global climate change.



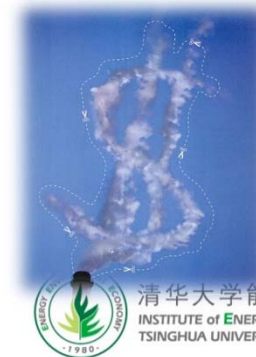
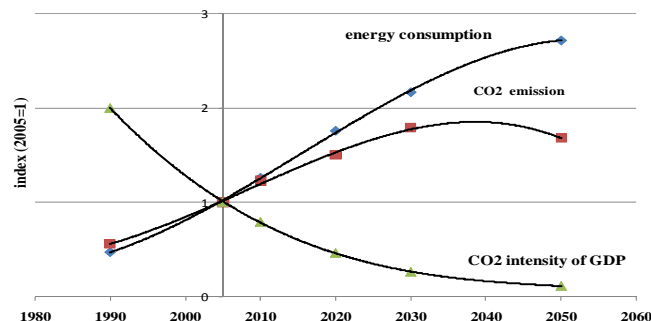
# 11. Substantial reduction in GDP energy intensity and carbon intensity is the major objectives and feed-in points of China's green economy and low carbon city development.

- The decrease of energy intensity and CO<sub>2</sub> per GDP reflect the increase of the benefits of consuming one unit of energy or CO<sub>2</sub>.
- The Chinese Government has promulgated a CO<sub>2</sub> intensity target of 40-45% reduction by 2020 compared to 2005 levels, on the basis of 20% energy intensity decrease during the 11<sup>th</sup> FYP, which integrate the domestic sustainable development and addressing global climate change, in line with China's development phase feature, reflects the principle of Common but Differentiated Responsibilities.
- The investment will be greater during 12th Five-Year-Plan period than 11th Five-Year-Plan period. According to estimation by McKinsey, the additional input for energy saving and emission reduction is about 1.5 trillion Yuan during 11th Five-Year-Plan period, and the number will be increased to 1.9-3.4 trillion Yuan during 12th Five-Year-Plan period, of which the rate without return will grow from 20% to 40%.
- The experiences of developed countries indicate that, the uptrend of GDP energy intensity is inevitable during industrialization phases. Japan's GDP energy intensity increased by 23% from 1960 to 1974, and South Korea's increased by 45% from 1971 to 1998. The GDP carbon intensity target in China indicates the determination and effectiveness.



## 12. The key measures to achieve green development and low carbon city construction is to shift the economic development pattern, and develop the industries characterized by low carbon emission, design low carbon traffic system, build low carbon housing and advocate low carbon consumption pattern.

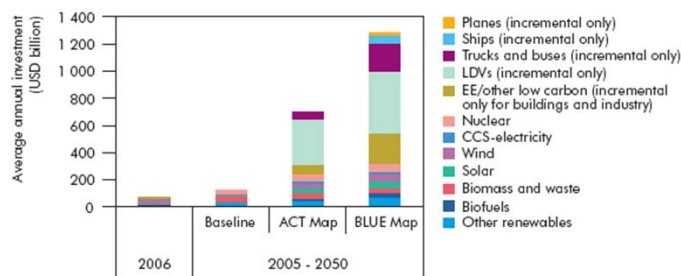
- Technological upgrading in traditional industries to develop energy efficient and low carbon production, and shift to the high level of the value chain and improve the value added rate, continue to play the leading role of energy efficient technology .
- Speeding the adjustment of industrial structure, and strategically developing the new emerging low carbon industries, to achieve industrial restructuring and structural energy conservation.
- Greatly developing new and renewable energy, and reducing the fossil energy share in primary energy mix. By degrees build sustainable energy system, and eventually, the economy development will not restrained by CO2 emission.
- Low carbon should be the main concept and measures of city planning, infrastructures and traffic system. Urbanization should avoid the high emission development trick and high emission “technology lock-up”.
- Shift the consumption pattern, and encourage public to get involved in building low carbon society.





# 13. The significant support to achieve green development and build low carbon cities is to strengthen the technological innovation and develop new emerging low carbon industries.

- The urgent global climate change situation induces large demand for low carbon technologies and promotes low carbon technological innovations and industrializations.
  - Energy conservation and efficiency technologies such as ultra-energy-efficient building, new energy and electric vehicles, waste heat utilization and clean coal technologies
  - New energy technologies such as wind and photovoltaic power technologies, biofuels, advanced nuclear energy and hydrogen technologies
  - Carbon capture and storage technologies (CCS) etc.
- Large-scale low carbon infrastructure constructions will bring substantial investments in new energy and energy efficiency industries. As new drives for economic growth, low-carbon energy and smart grid will be the two major new industries.
- According to UNEP estimates, if the world achieve the target of halving greenhouse gas emissions in 2050, low carbon technology investment will be as 10 times during 2005 to 2050 as the in baseline scenario, and then the annual average is 1.2 trillion.



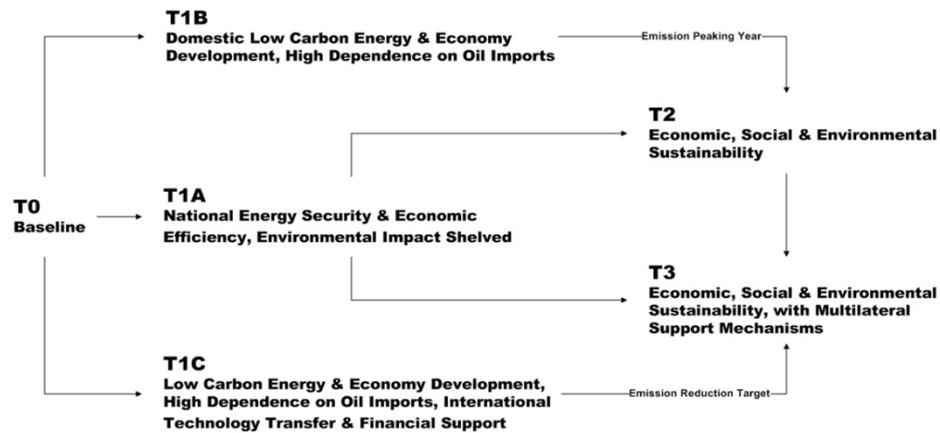
Sources: UNEP and New Energy Finance, 2007 and IEA.



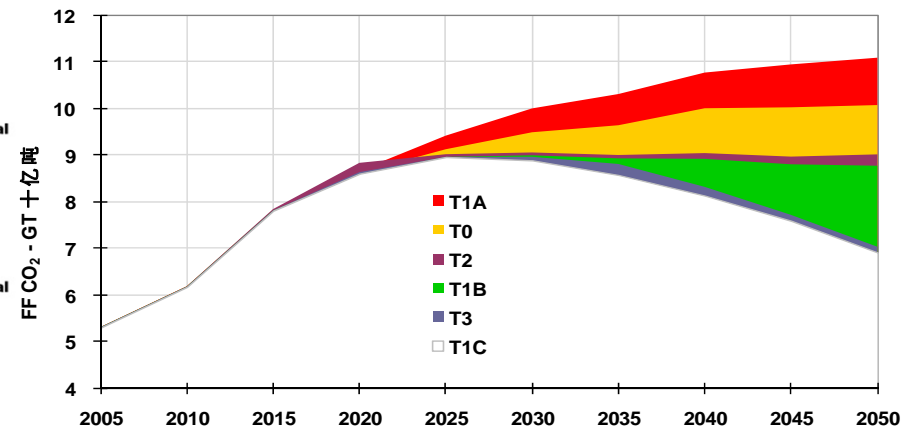
# 2050 Low-carbon Energy Development in China ( I )

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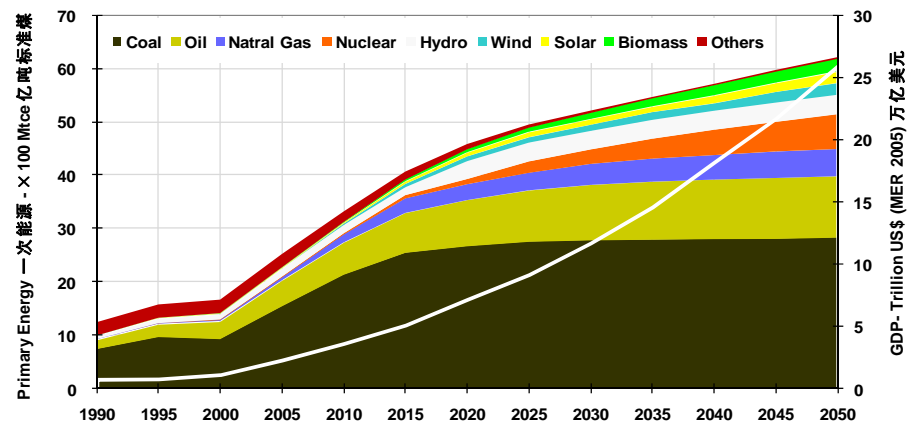
2050 Low-carbon Energy Transition Scenario



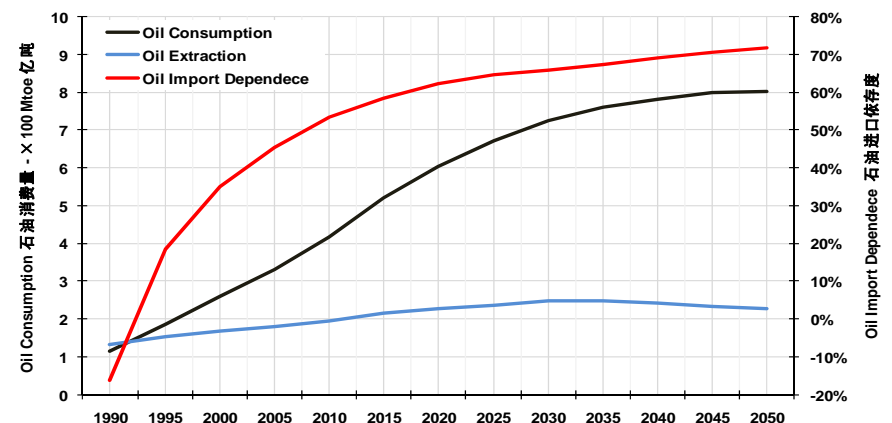
CO2 Emissions in China



Primary Energy Consumption, T0



Oil Extraction, Consumption and Import, T0

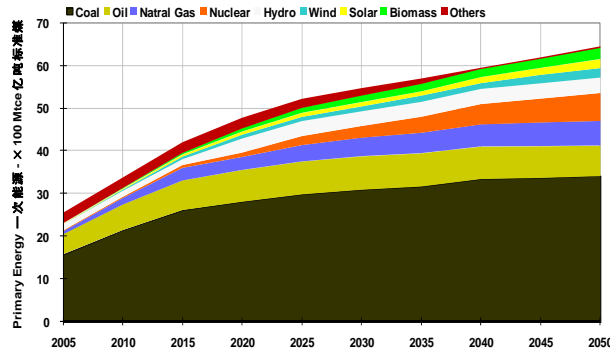


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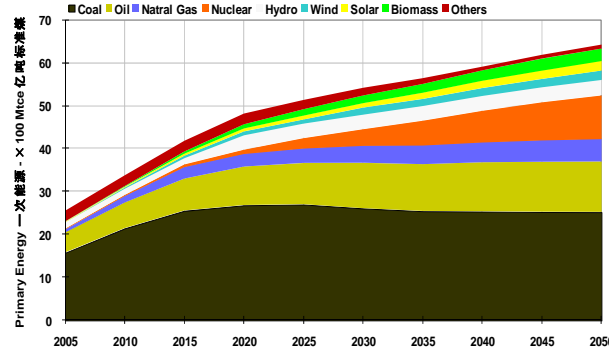
# 2050 Low-carbon Energy Development in China ( II )

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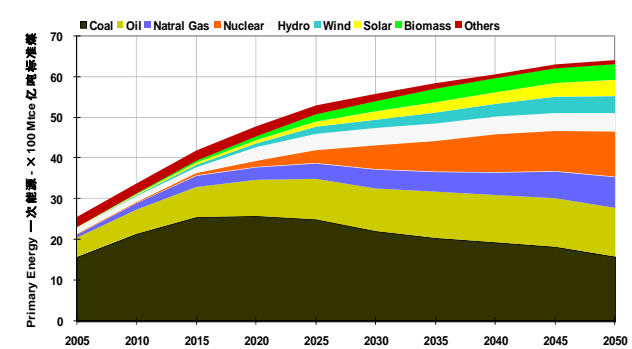
Primary Energy Consumption, T1A



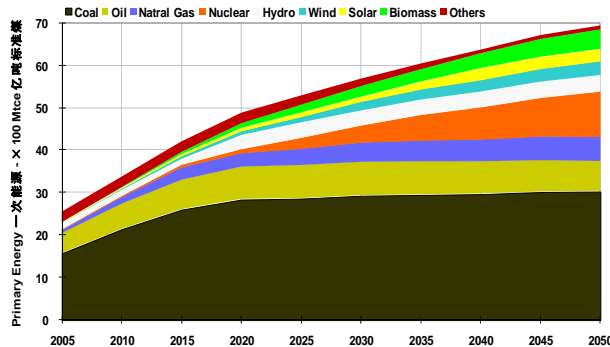
Primary Energy Consumption, T1B



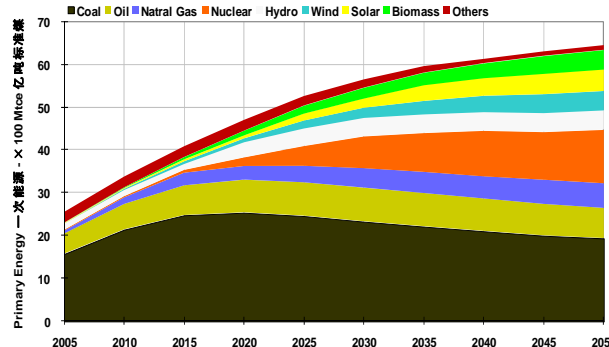
Primary Energy Consumption, T1C



Primary Energy Consumption, T2



Primary Energy Consumption, T3



■ Technology progress and policies will have major impact on the future of energy system in China, therefore R&D&D of low-carbon energy technologies should be strengthened.

■ International technology transfer & cooperation will also have important impact.



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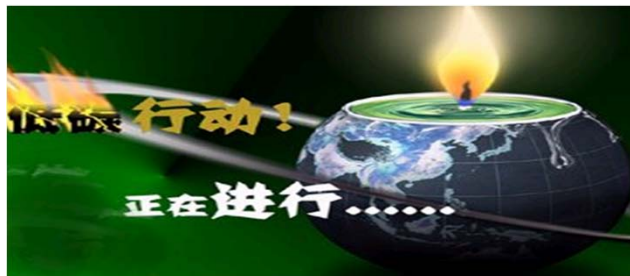
## **14.Five-province and eight-city low-carbon demonstration is expected to lead green and low-carbon development concept spreading, planning and implementation.**

- The Low-carbon development concept should be understood more deeply and the low-carbon development goal should be progressive.
- ----- CO<sub>2</sub> emission intensity should decrease 45% in 2020 compared to 2005 level. Some cities should have a 40-50% emission reduction during the same period. Guangdong province even proposed to try out the total emission control target in the Pearl river delta region.
- Clear goals and specific implementation rules well planned for development mode change, industrial structure change of development, and industrial, transport and construction sector energy saving and new energy and renewable energy development.



## 14. Five-province and eight-city low-carbon demonstration is expected to lead green and low-carbon development concept spreading, planning and implementation.

- Reinforce emission statistic, test and management system in most pilot cities and explore carbon trade mechanism in an active manner.
- The trend for some of the pilot provinces and cities to rely on heavy industry to expand their capacity and spur economy is still apparent.
- Industries, transportations and building, are the main challenges to our cities along the low-carbon road currently. If cities in China will transit successful and then it will become the three carriages to low-carbon future.

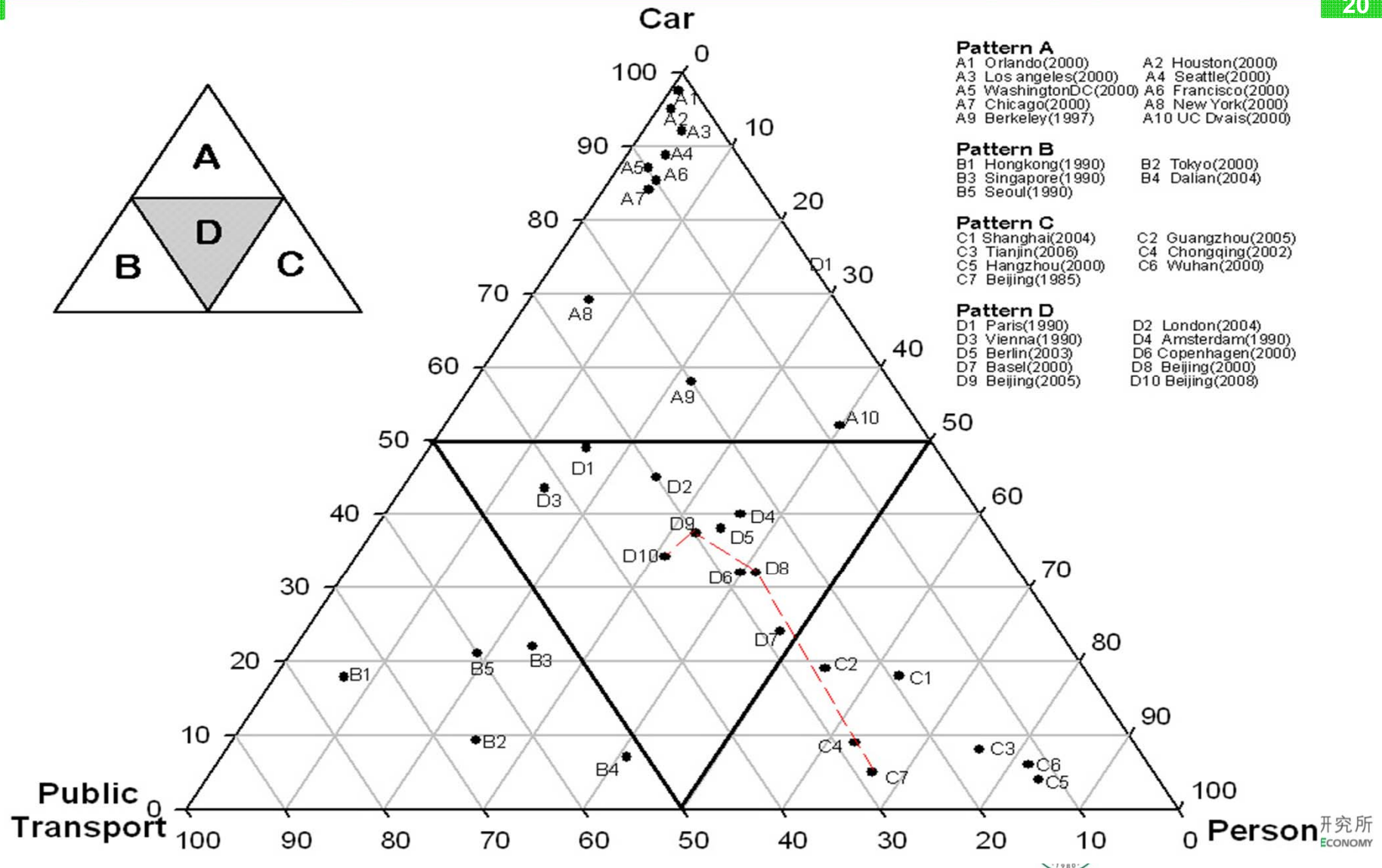


## 14. Five-province and eight-city low-carbon demonstration is expected to lead green and low-carbon development concept spreading, planning and implementation.

	Low-Carbon Demonstration	Low-carbon Transportation System Development Pilot	Pilot City on Low-carbon and Ecology
Ministry	NDRC(National Development and Reform Commission )	MOT(Ministry of Transportation)	MOHURD(Ministry of Housing and Urban-Rural Development)
Area	Five-province: Guangdong, Hubei, Liaoning, Shanxi, Yunnan Eight-city: Tianjin, Chongqing, Hangzhou, Xiamen, Shenzhen, Guiyang, Nanchang, Baoding	Ten-City: Tianjin, Chongqing, Shenzhen, Xiamen, Hangzhou, Nanchang, Guiyang, Baoding, Wuhan, Wuxi	Shenzhen
Goal	Advance of Low-carbon Development	Development of Low-carbon Transportation System	Low- carbon and ecological city model
Content	Planning and Relative Policy and Measures; low carbon industry and consumption systems; statistical and verification systems for GHG	transportation infrastructure and equipment; Transportation organization model; Intelligent traffic projects; Traffic public information services system	Relative Policy and Measures; Technical standards

# 15. BEIJING CASE: Four traffic patterns by trip structure and representative cities

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# 15. BEIJING CASE: Scenarios description

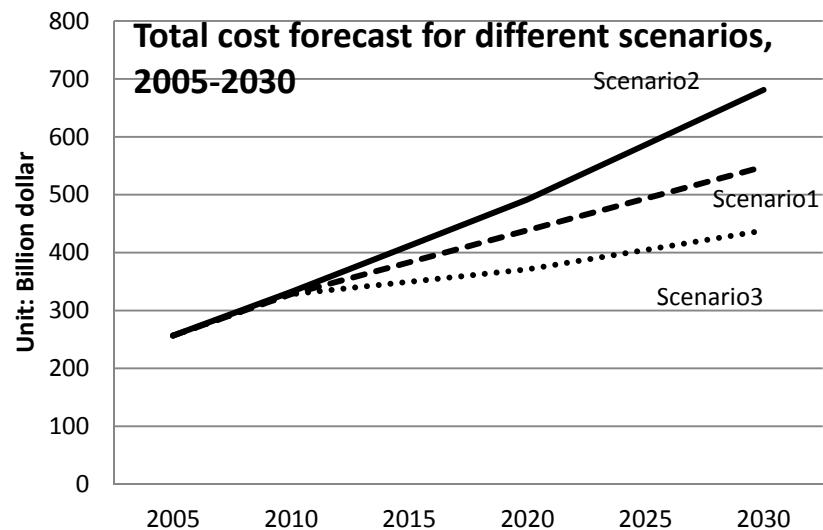
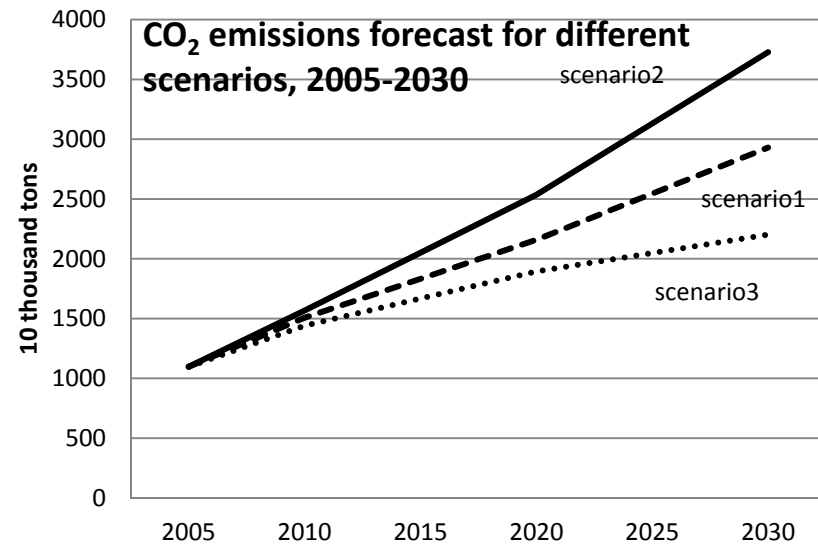
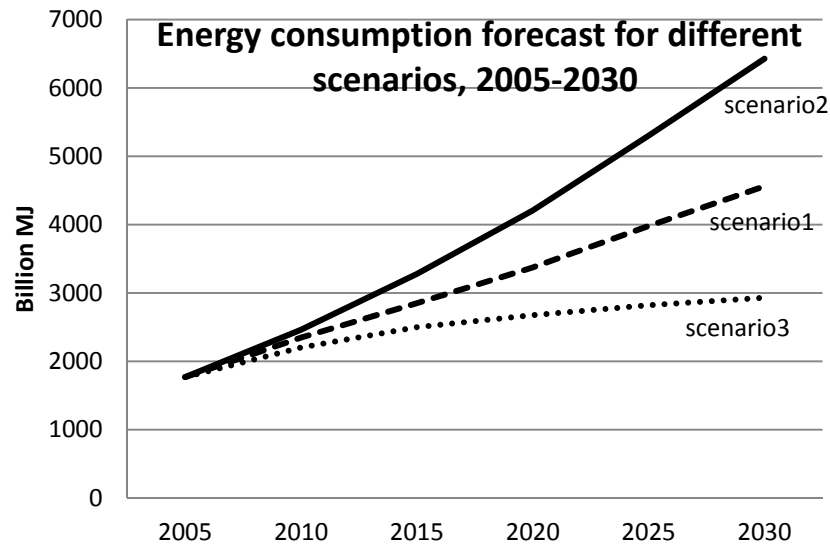
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Scenarios	Scenario description
Scenario 1: Reference scenario	The urban transport system would maintain unchanged in pattern D. The new subway lines were built and taken into operation one by one according to the transport plan of Beijing. At the same time, the family car plan would be encouraged by the government. The urban transport pattern would tend to the urban development patterns in Europe, such as London, Paris.
Scenario 2: High-motorization oriented pattern scenario	For most families, the private car becomes the necessities of living, and people travel by car. The urban transport pattern would tend to the pattern of American cities, such as New York, Berkeley. The private car population is higher and the ratio of traveling by <i>car</i> will be more than 50% in the future.
Scenario 3: Bus and train oriented scenario	will learn the experience of urban transport from , Hongkong or , promoting the public transport priority policy and keeping a low public transport fares. The government will encourage people travel by bicycle and public transport, but limit the traveling by car. The <i>public transport</i> will be the main mode for traveling.



# 15. BEIJING CASE: Construction of Low-carbon Transportation system will be the major challenge in Beijing

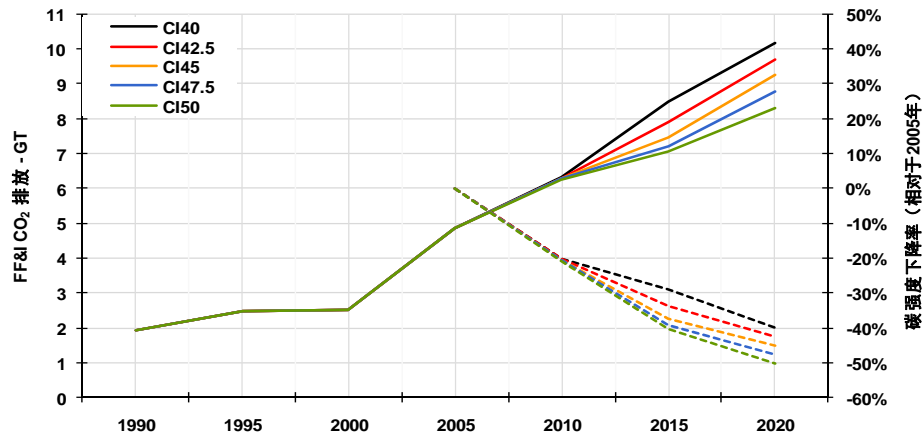
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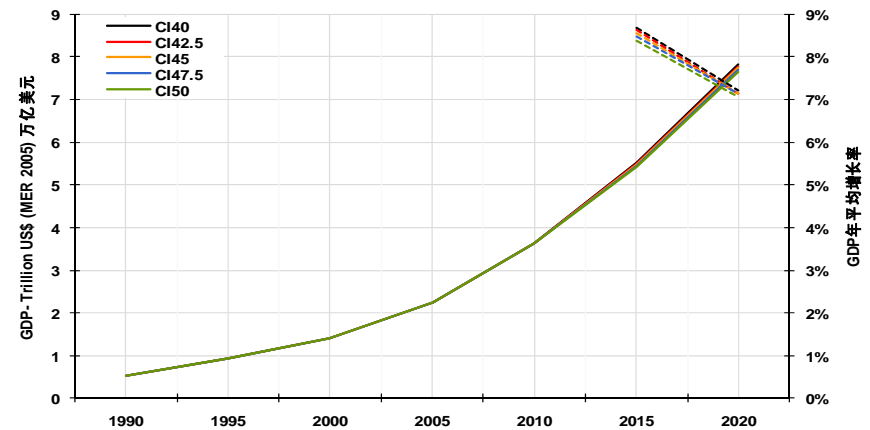
# 16( I ). 2020 NAMAs(Nationally Appropriate Mitigation Actions ) in China

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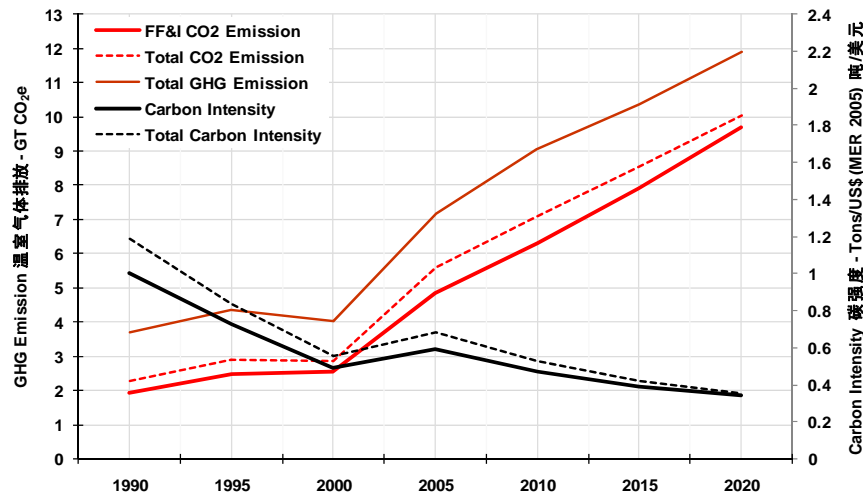
CO<sub>2</sub> Emissions ,Carbon Intensity Goal, China



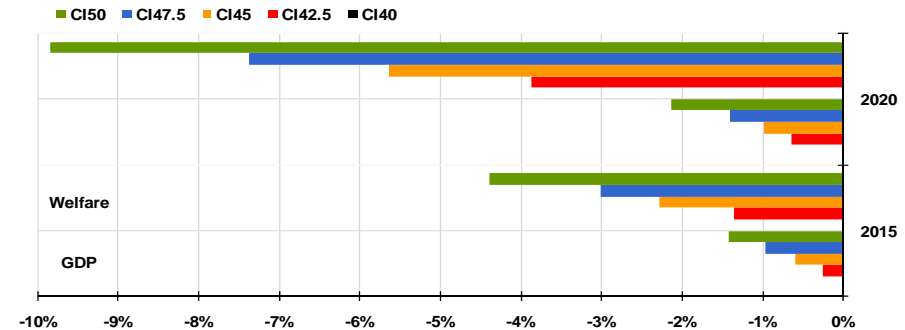
GDP, Carbon Intensity Goal, China



GHG Emissions, CI42.5, China



Impact on GDP and Welfare by Carbon Intensity Goal



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**16( II ). Make a unified and coordinated plan with arrangement in advance so as to take into consideration China's domestic sustainable development and the global environment of coping with climate change; near and long term goals; and the 12<sup>th</sup> FYP and the 13<sup>th</sup> FYP**

- During the 12<sup>th</sup> FYP, the bounded target of energy intensity reduction and CO<sub>2</sub> emission reduction is the second interim target to realize a 40-45% CO<sub>2</sub> emission reduction in 2020.
- The share of the non-fossil energy rose 3 percentage point during the 12<sup>th</sup> FYP; CO<sub>2</sub> emission intensity decreased 2~3 percentage point faster than the energy intensity;
- In 2020, the share of the non-fossil energy will account for 15% of the total energy use and CO<sub>2</sub> emission intensity decrease from 2005 level will be 5 percentage point faster than the energy intensity.





**16 (III). Make a unified and coordinated plan with arrangement in advance so as to take into consideration China's domestic sustainable development and the global environment of coping with climate change; near and long term goals; and the 12<sup>th</sup> FYP and the 13<sup>th</sup> FYP**

- If the CO<sub>2</sub> emission intensity could decrease 20%, 18% and 16% respectively during the 11<sup>th</sup> FYP, 12<sup>th</sup> FYP and 13<sup>th</sup> FYP, the 2020 goal of reducing CO<sub>2</sub> emission intensity 45% on 2005 basis will be realized.
- In the long run, the global target to prevent the temperature from rising more than 2°C will place a more and more strict restraint on China's carbon emission. A meeting will be held in Durban, South Africa at the end of this year to discuss the long-term goal of carbon emission reduction and peak emissions for each country. Therefore, the challenge of carbon emission restraint must be faced with in the long term.





# Thanks for Your Attention!

Dr. ZHOU JIAN

Email: [zhoujian@tsinghua.edu.cn](mailto:zhoujian@tsinghua.edu.cn)



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INSTITUTE of ENERGY, ENVIRONMENT and ECONOMY  
TSINGHUA UNIVERSITY