

# Strategy Analysis for Decarbonization of China

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Dr. Liu Qiang

Director of Strategy and Planning Department

National Center for Climate Change Strategy and International  
Cooperation (NCSC)

# Key policy documents

China have issued a series of policy documents, such as *12-FYP Greenhouse Gas Emission Control Program* and *National Adaptation Strategy for Climate Change*.

China have published *National Planning to Address Climate Change*, to further identify the specific goals, missions, policies and measures by 2020.

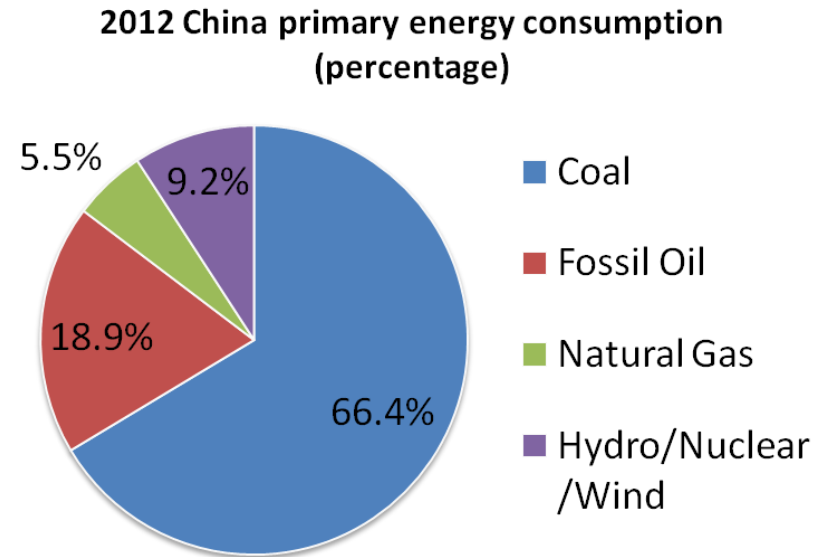
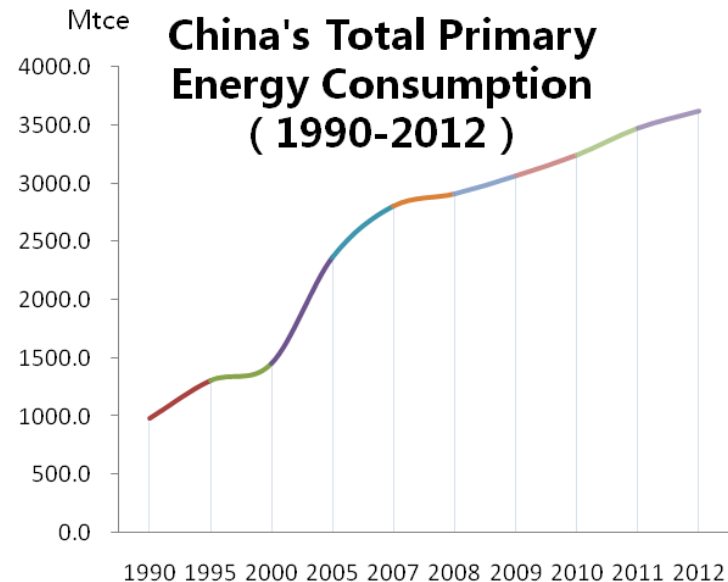
Announced the carbon emission peaking target (around 2030) and non-fossil-fuel development target (20% of PE) in Sept. 2014,

In June 2015, Chinese government submitted INDC: 2030 carbon emission peaking target; 60-65% carbon intensity target; non-fossil-fuel target; forestry target...

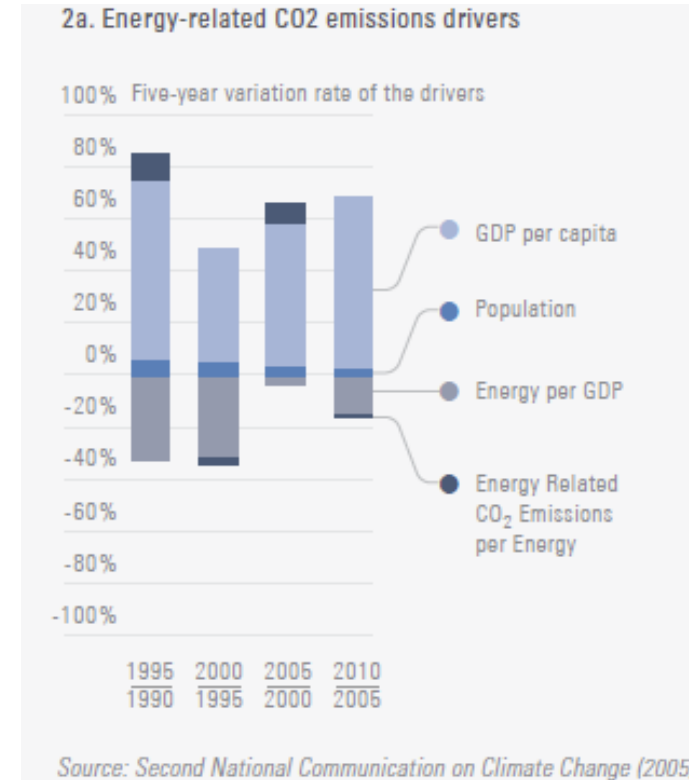
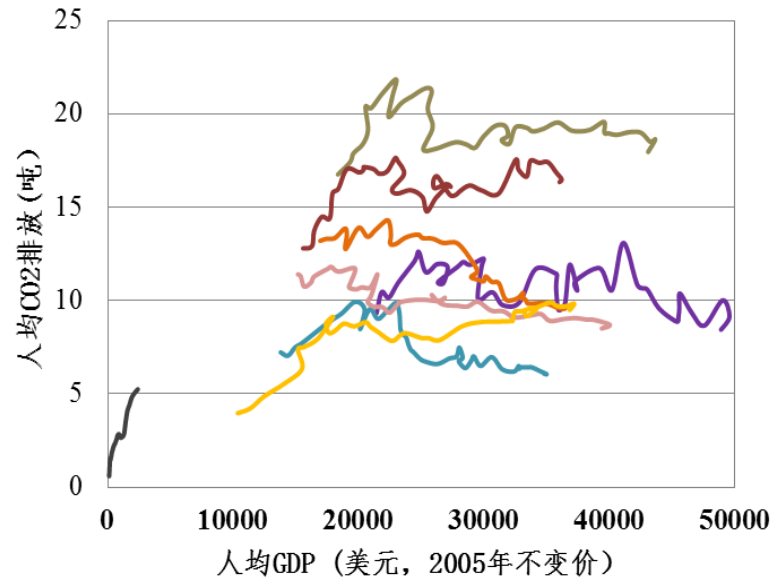
# Energy consumption in China

## Rapid growth of energy growth

- ❑ **Primary energy consumption: 4.26Gtce in 2014**
- ❑ **Coal still dominates and takes around 2/3 of total energy consumption**
- ❑ **Renewable development experiences a rapid growth in recent years**

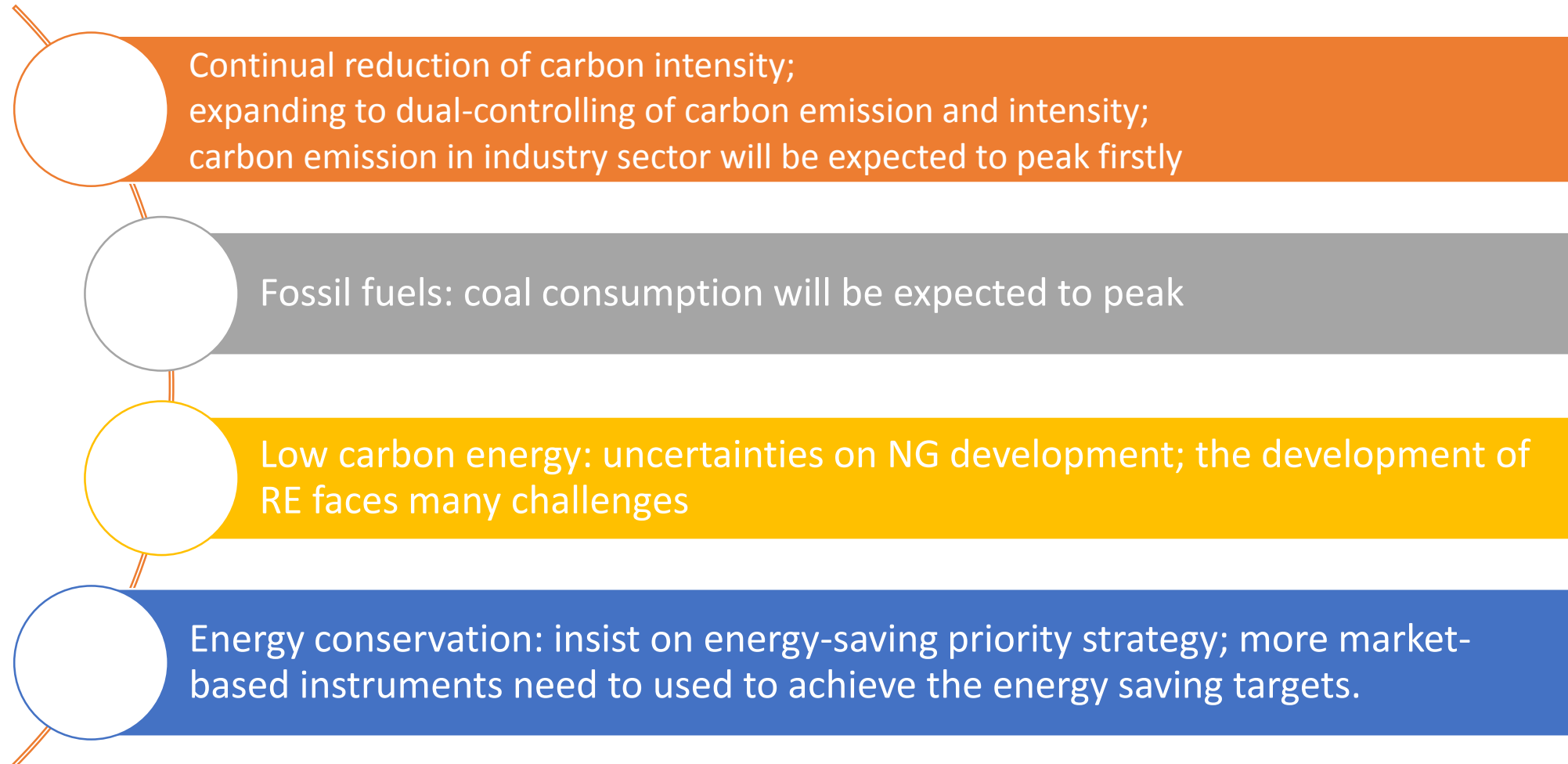


# Carbon emissions in China



- Huge carbon emission and high emission growth
- Emission per capita has achieved the world average level
- Carbon intensity has decreased by large degree since 2005, mainly due to energy saving measures

# Main trends for carbon emission control in 13<sup>th</sup>-FYP



# Decarbonization pathway and strategy analysis

***Top-down analysis:*** 2 degree target; global emission cap and carbon budget



***Bottom-up analysis:*** mitigation potential by sectors; structure change, energy optimization and technology improvement



***Combination analysis:*** targets, scenarios, measures and policies

# Methodology for top-down analysis(1)

## IPCC AR5 WGI关于全球碳排放空间的最新数据和结论

排放空间分析依据：是否存在实现2度温升控制目标的可能性



Possibility for 2 degree target achievement

可能的典型浓度情景及对应排放空间 **Carbon cap for 2 degree target**

RCP2.6 (421 ppm) : >66% possibility

RCP4.5 (538 ppm): <33% possibility

分配依据：  
是否追究1990年前排放历史责任  
人年均排放相等原则



Allocation principle:

- Historical responsibility by 1990
- Equivalent in annual per capita emission

中国的碳排放空间 **carbon emission potential for China**

路径分析依据：  
是否采用CCS  
关键年份排放量

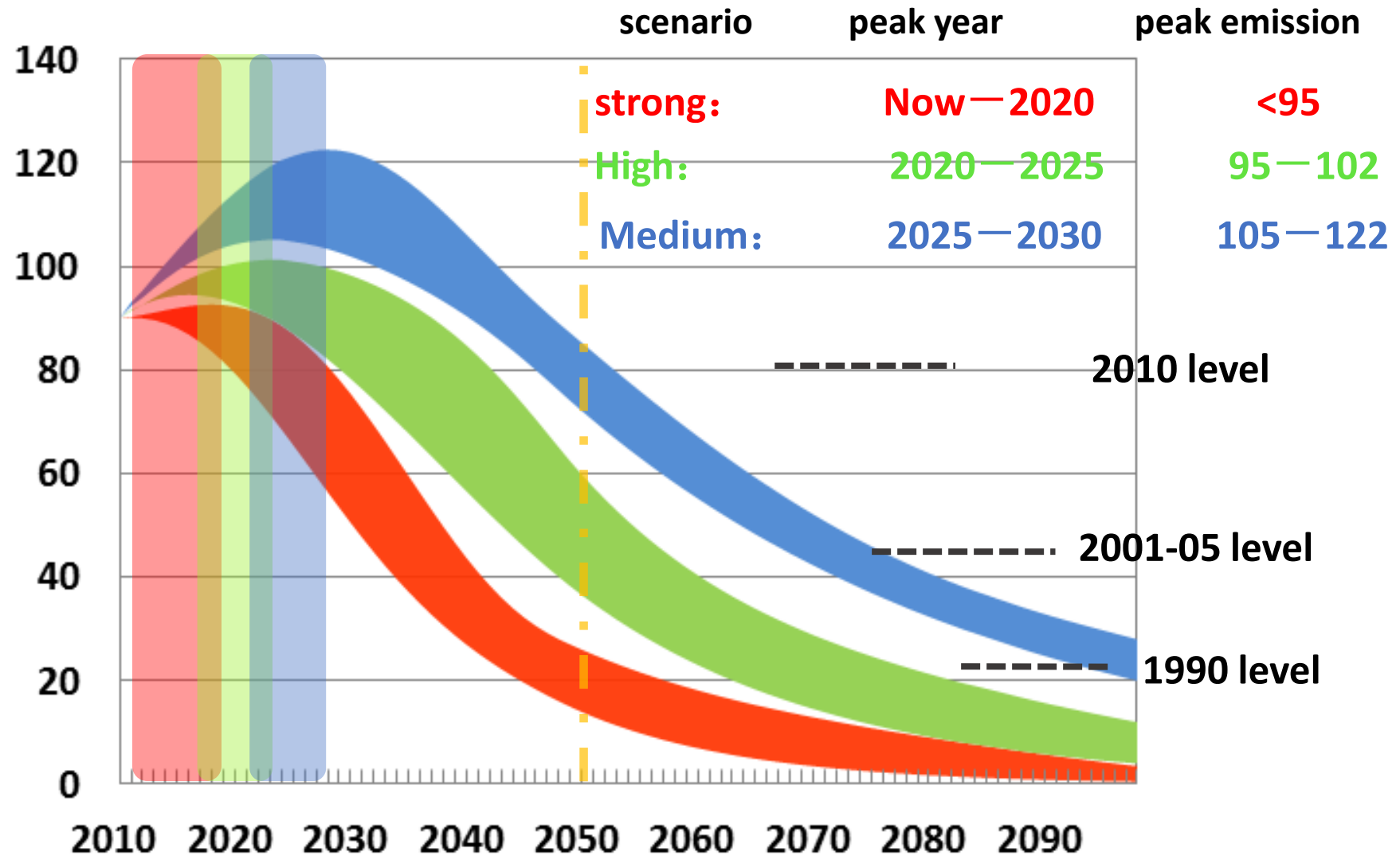


Pathway analysis:

Carbon emissions in key years  
CCS application potential

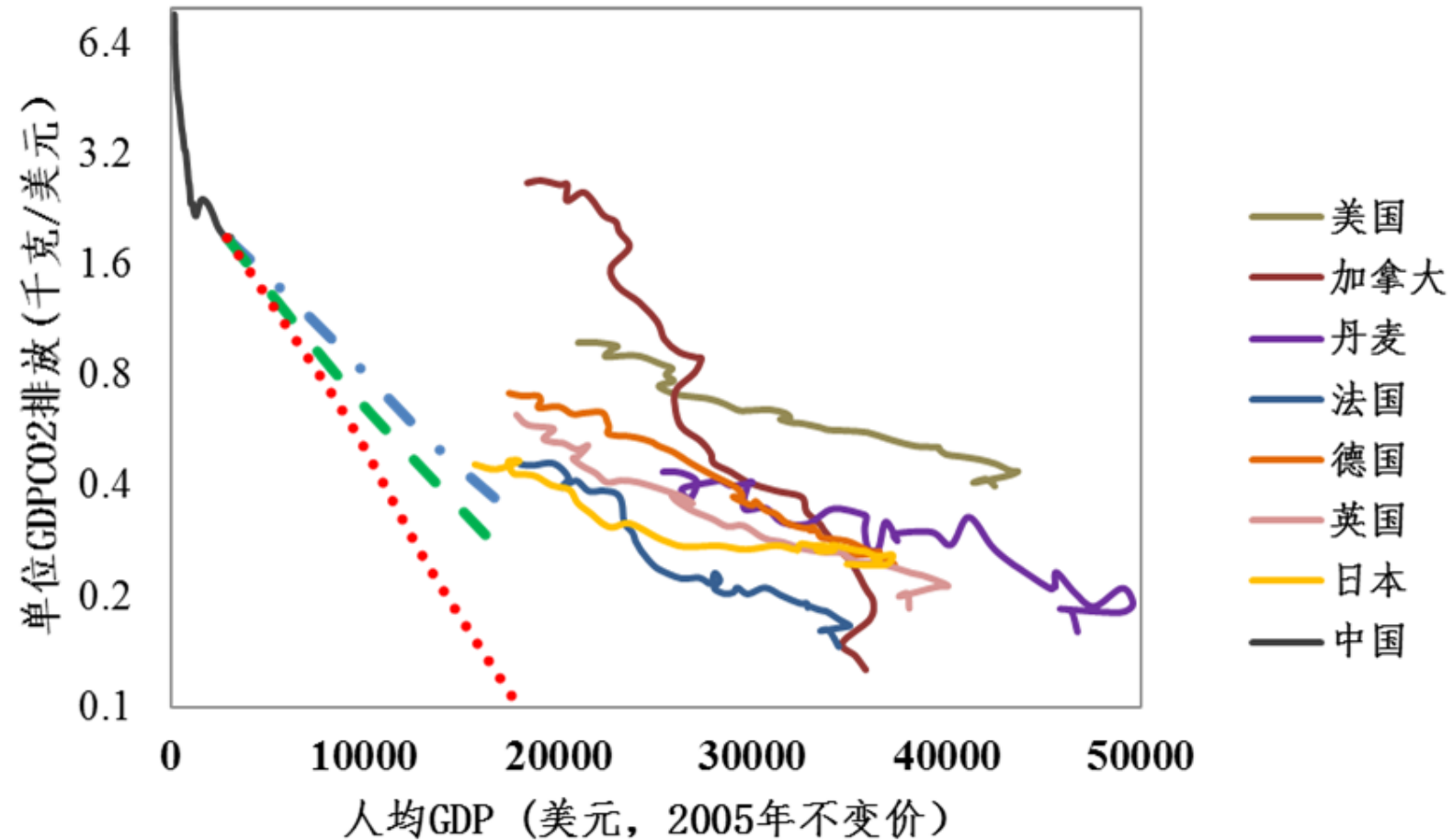
中国可能的排放路径 **Low-carbon pathway for China**

# Three scenarios: different strength on carbon emission constraint





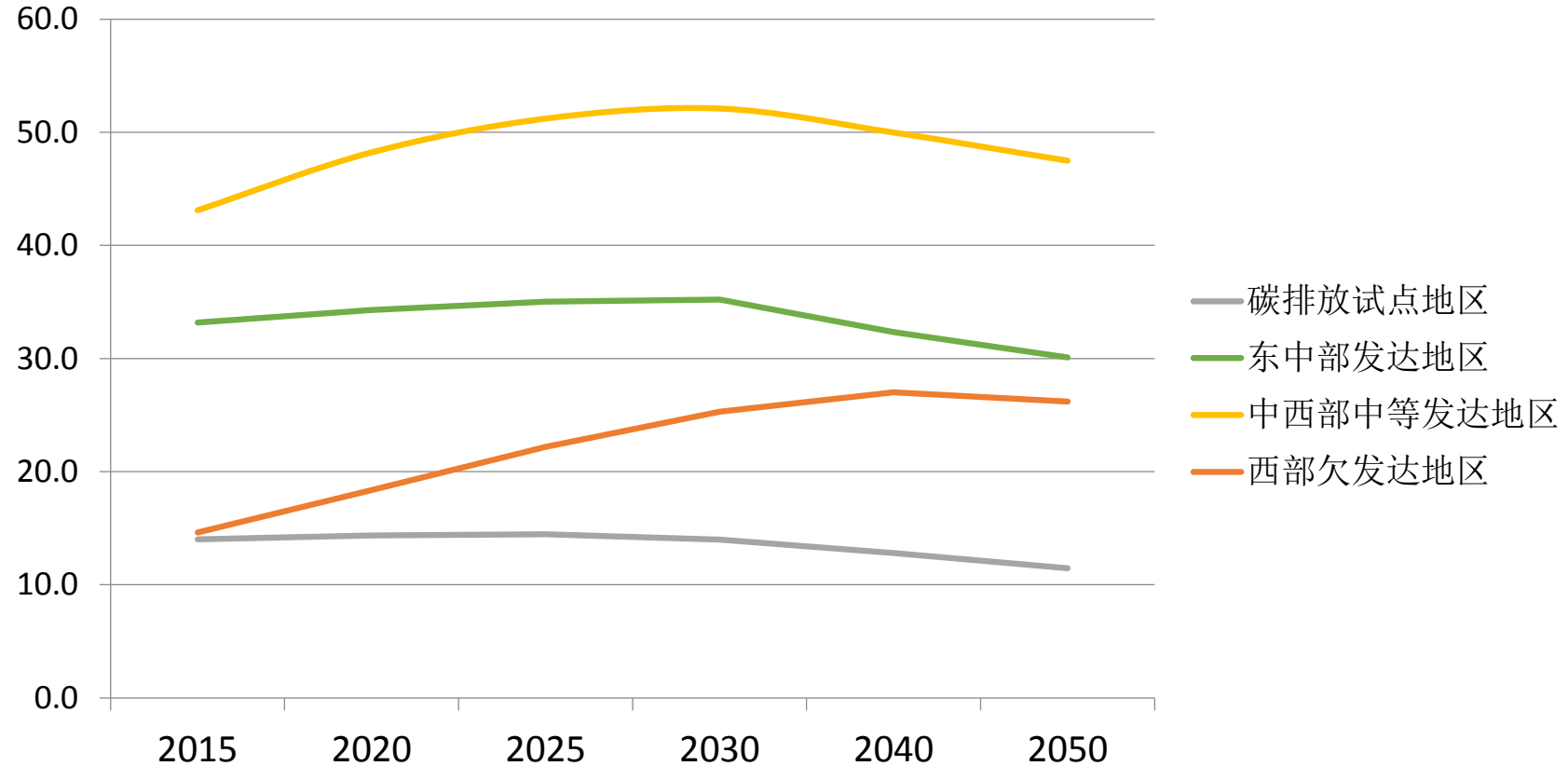
# Comparison with developed countries pathway



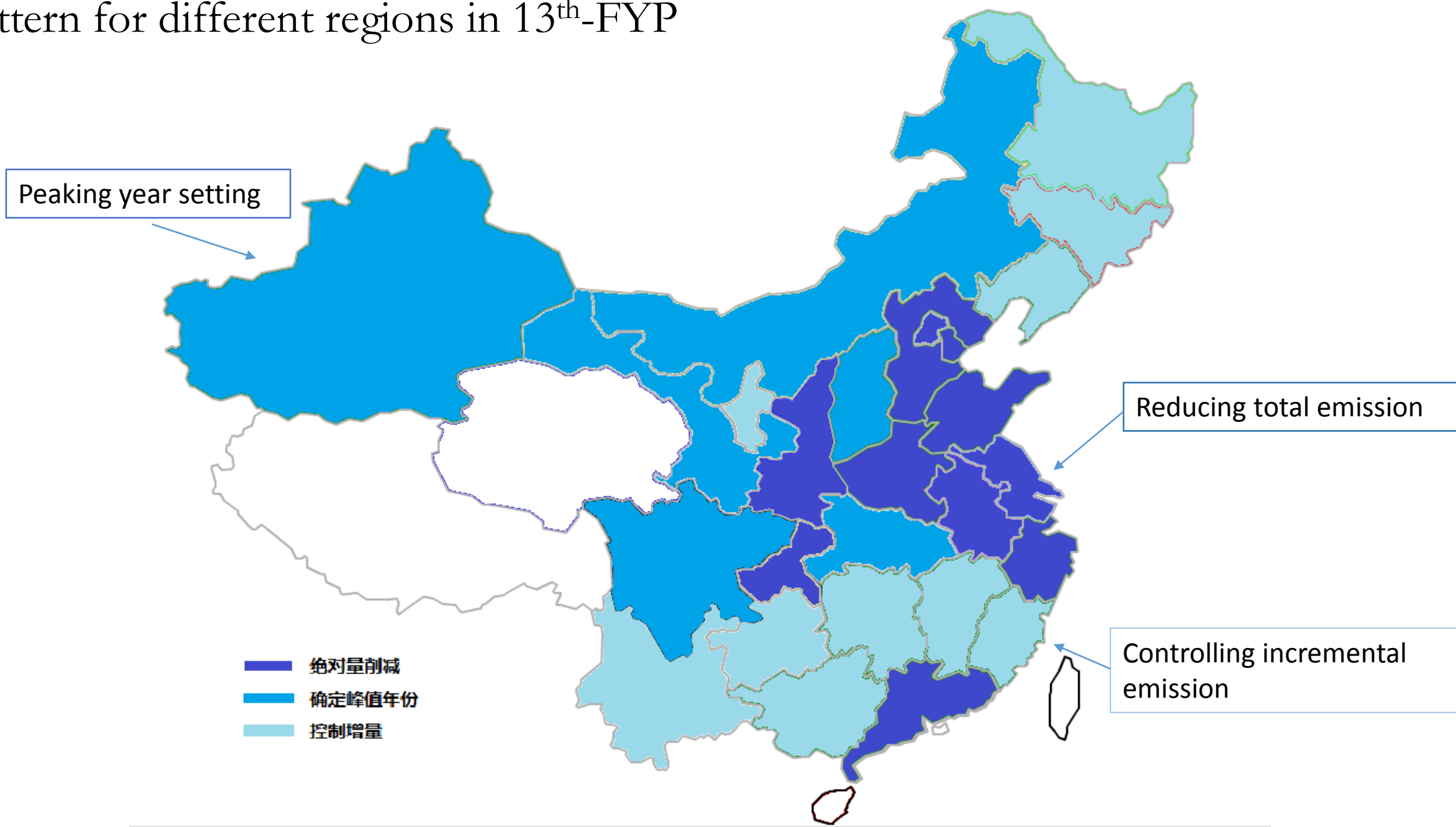
In medium-strength scenario, the carbon emission per GDP is expected to exceed the best level of developed countries on same economy condition

# Possible carbon emission pathways for different regions

100 MtCO<sub>2</sub>



# Possible designing of coal consumption controlling pattern for different regions in 13<sup>th</sup>-FYP



# Decarbonization pathway and strategy analysis

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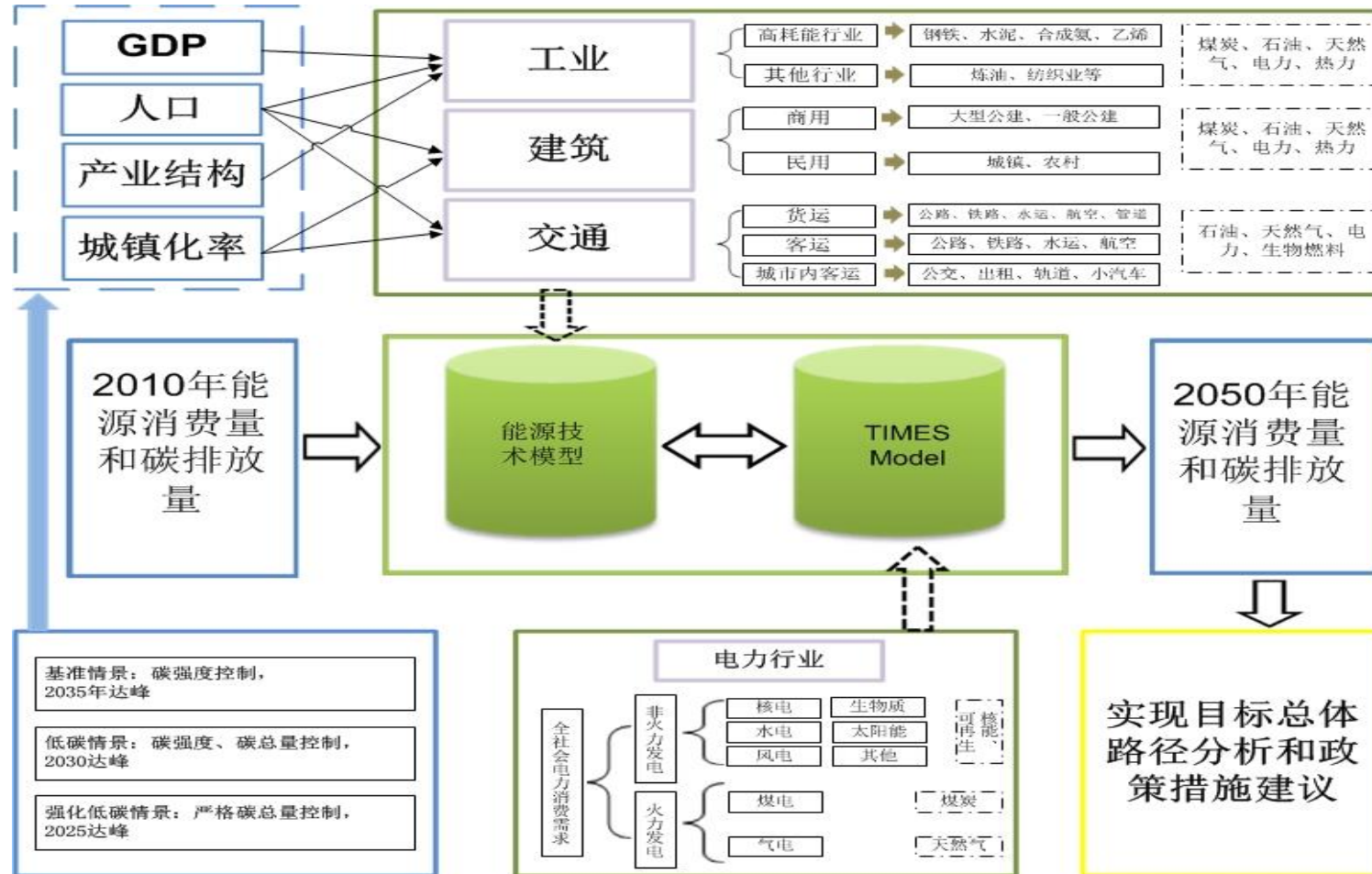


*Bottom-up analysis:* mitigation potential by sectors; structure change, energy optimization and technology improvement



*Combination analysis:* targets, scenarios, measures and policies

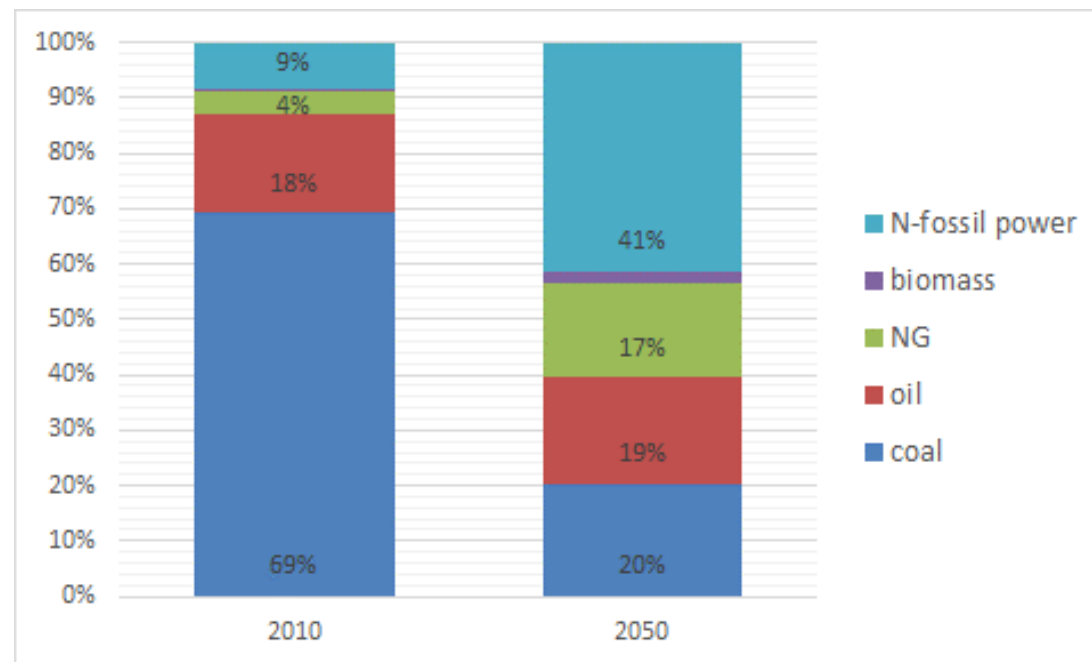
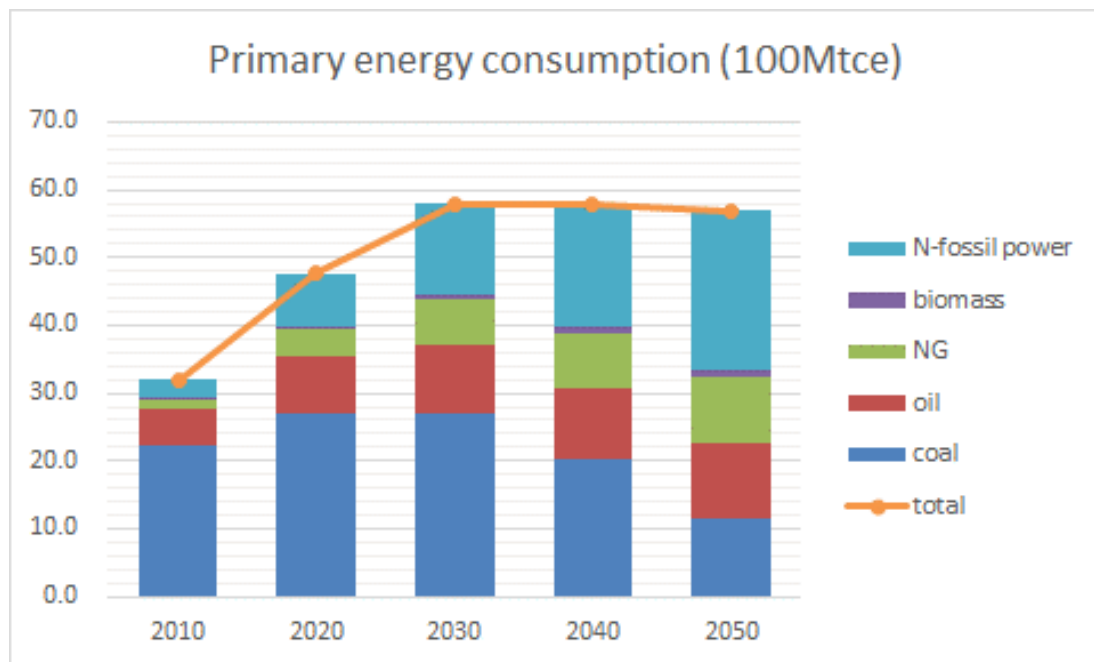
# Modelling structure for bottom-up analysis



# Deep Decarbonization Pathway result (DDPP)

## ----Primary energy trend from 2010 to 2050

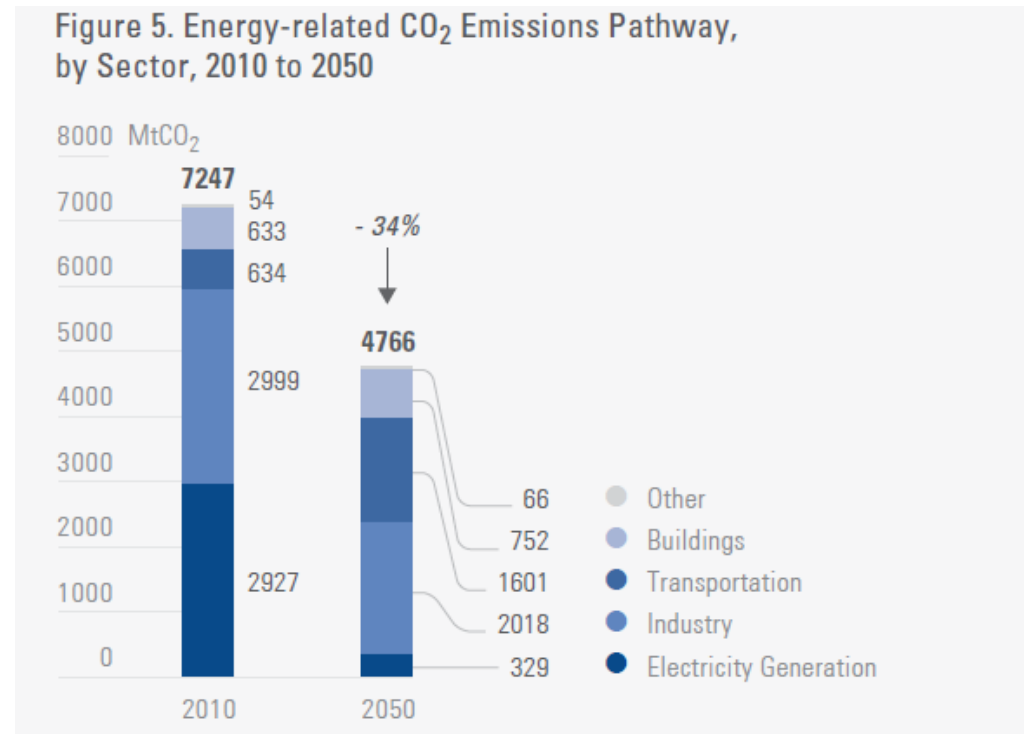
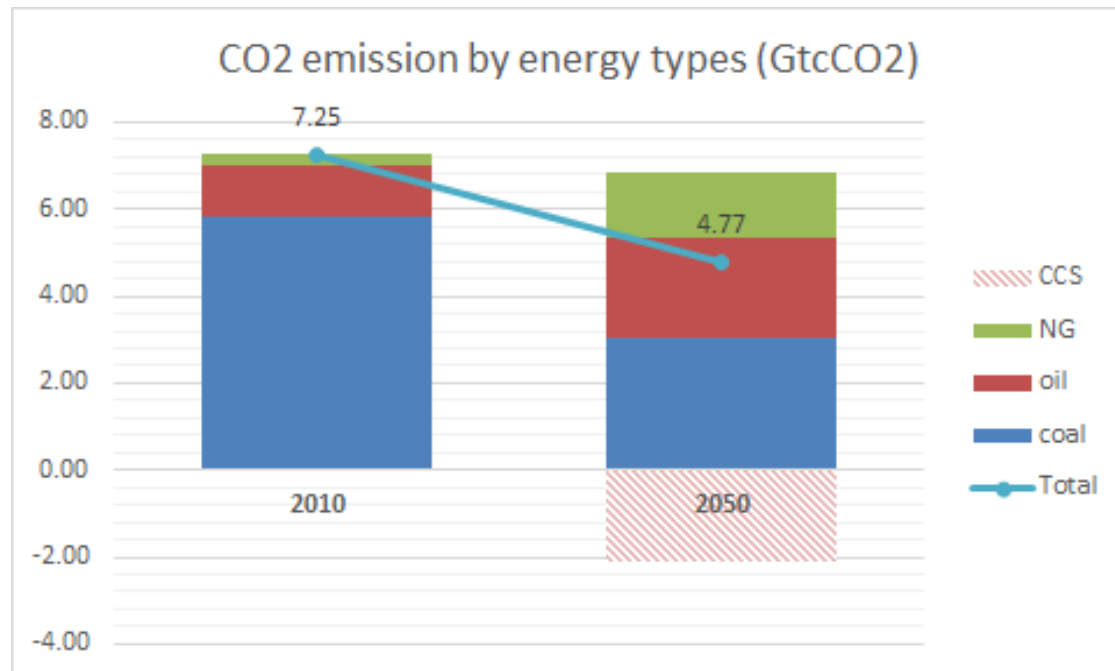
- Energy trends are significantly decoupled from production growth with an increase of primary energy by 78%, from 3.2 Gtce in 2010 to 5.7 Gtce in 2050.
- The share of fossil fuels decrease from more than 90% to lower than 60%
- coal consumption will decrease after 2030



# Deep Decarbonization Pathway result (DDPP)

## ---- CO2 emission from 2010 to 2050

- Energy-related CO2 emissions decrease by 34%, from 7.25 GtCO<sub>2</sub> in 2010 to 4.77 GtCO<sub>2</sub> in 2050
- The industry sector emissions remain the largest, but buildings and transportation increase in share, from 17% in 2010 to 49% of 2050 emissions



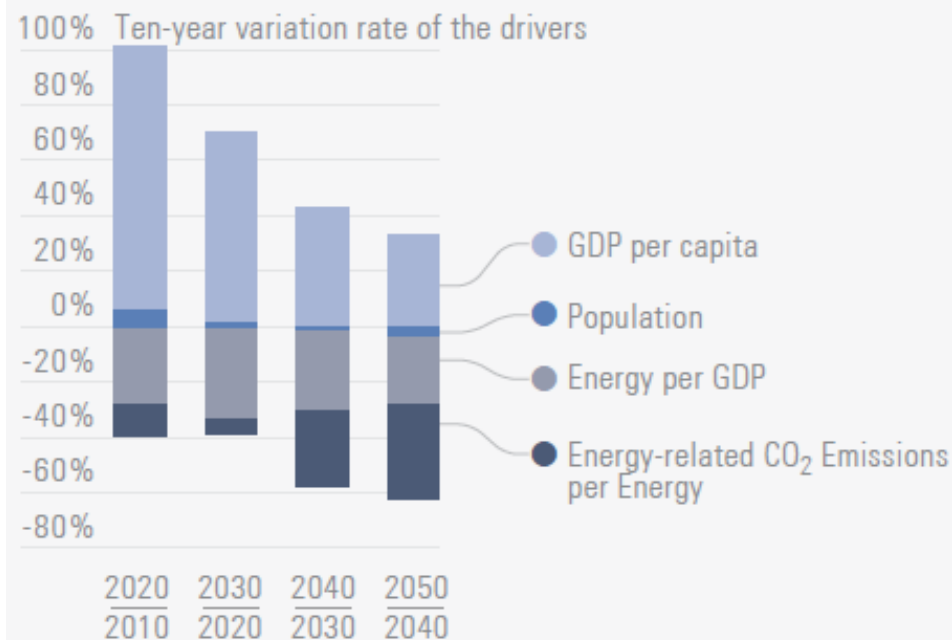
# Deep Decarbonization Pathway result (DDPP)

## ---- Driving forces for decarbonization

- Energy-related CO<sub>2</sub> emission reduction is essentially due to a decrease of both the primary energy per unit of GDP by 73% and of energy-related CO<sub>2</sub> emissions per unit of energy by 61%

Figure 4. Energy-related CO<sub>2</sub> Emissions Drivers, 2010 to 2050

### 4a. Energy-related CO<sub>2</sub> emissions drivers



### 4b. The pillars of decarbonization

#### Pillar 1.

##### Energy efficiency

Energy Intensity of GDP



#### Pillar 2.

##### Decarbonization of electricity

Electricity Emissions Intensity



#### Pillar 3.

##### Electrification of end-uses

Share of electricity in total final energy





# Decarbonization pathway and strategy analysis

*Top-down analysis:* 2 degree target; global emission cap and carbon budget



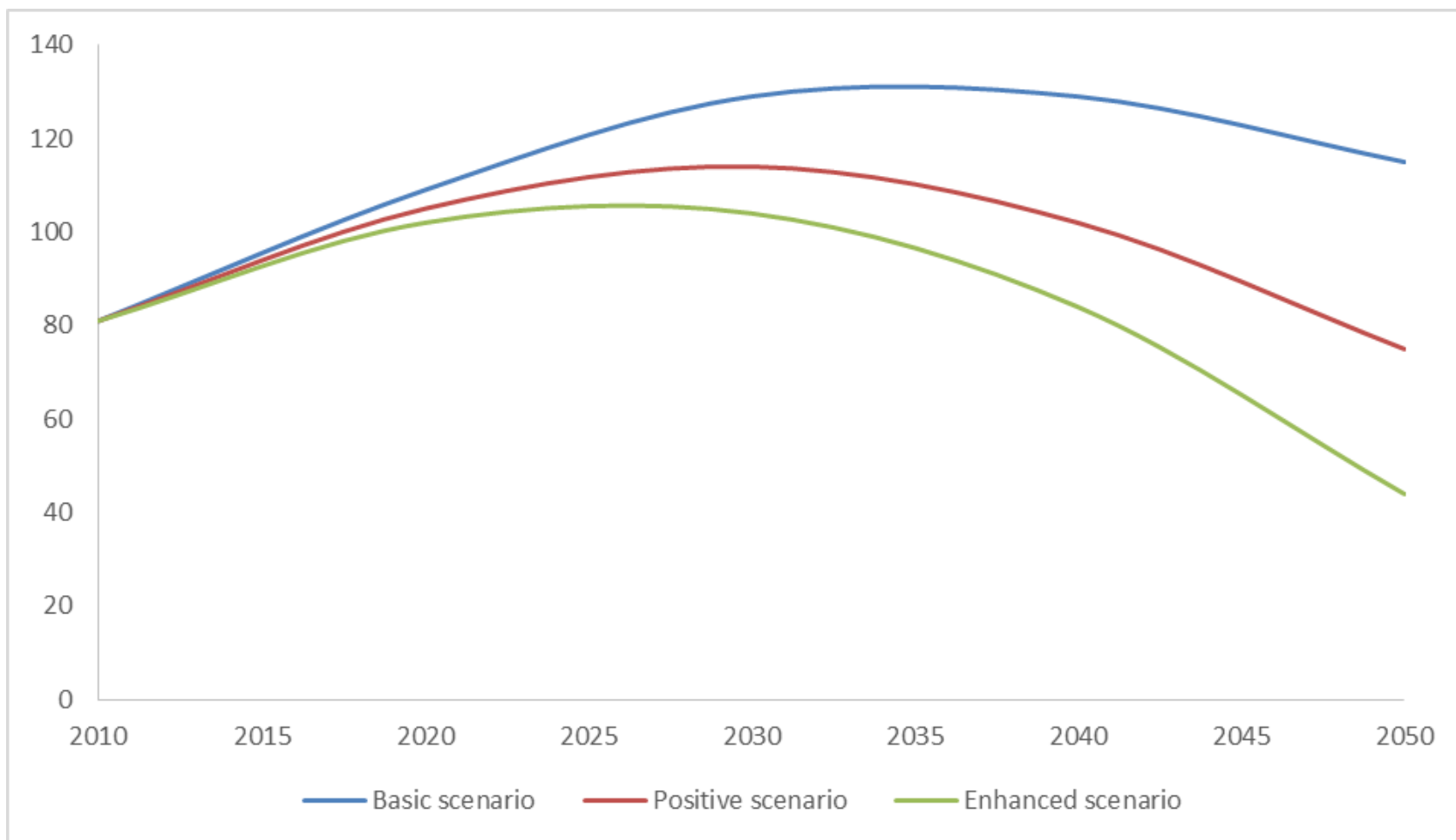
*Bottom-up analysis:* mitigation potential by sectors; structure change, energy optimization and technology improvement



*Combination analysis:* targets, scenarios, measures and policies

# Strategic pathway of LC development in China (NCSC)

- Energy-related CO2 emission (100Mt)



# Challenges and opportunities

- ***Uncertainties and challenges:***

- Economic growth: new-normal; largely uncertain on the growth rate
- Industrial structure: future adjustment potential; changes in the mode of development
- Urbanization pattern: triggered by the demand of social development
- LC energy utilization: large scale use and supporting condition

- ***Near term opportunities:***

- Change the concept of development
- Deepen the energy reform, especially the reform of the energy pricing system and fiscal taxation system
- Pricing Carbon
- Coal consumption controlling and reduction

# Direction and Requirements

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## **Enhancing the controlling of carbon emission:**

Achieving the carbon emission peak by 2030, forcing the transition of economy and social development. Strictly controlling the growth of carbon emission from now, turning from relative controlling to absolute controlling

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## **Controlling the carbon emission by sector:**

The carbon emission in industry sector need to peak as early as possible, leaving more space for the growth of tertiary industry and living consumption

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## **Controlling the carbon emission by region:**

East regions need to peak at first, leaving more space for west and poor regions' development, but west regions also need to control the speed of carbon emission growth

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## **Controlling the high-carbon energy consumption:**

Controlling the growth of energy consumption. Coal consumption need to peak as early as possible, leaving more space for NG and Non-fossil. Low carbon energy will become dominant energy in 30-40 years, through the electrification, network and intelligence of energy system.

# Measures and Policies

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## **Enhancing the regulation and co-control:**

law; standard; co-control with local pollution and coal controlling; statistic

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## **Enhancing the funding support for low carbon development:**

more financial input, innovative supporting scheme, enhanced investment for key sectors and technologies

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## **Completing the market-based instruments:**

carbon emission trading scheme, energy pricing reformation, carbon tax

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## **Strengthening the guiding on consumption:**

pricing signal, government procurement, low carbon incentive mechanism (e.g. labelling)



**Thank you for your attention!**

[liuqiang@ncsc.org.cn](mailto:liuqiang@ncsc.org.cn)