The low carbon development roadmap of power sector in China

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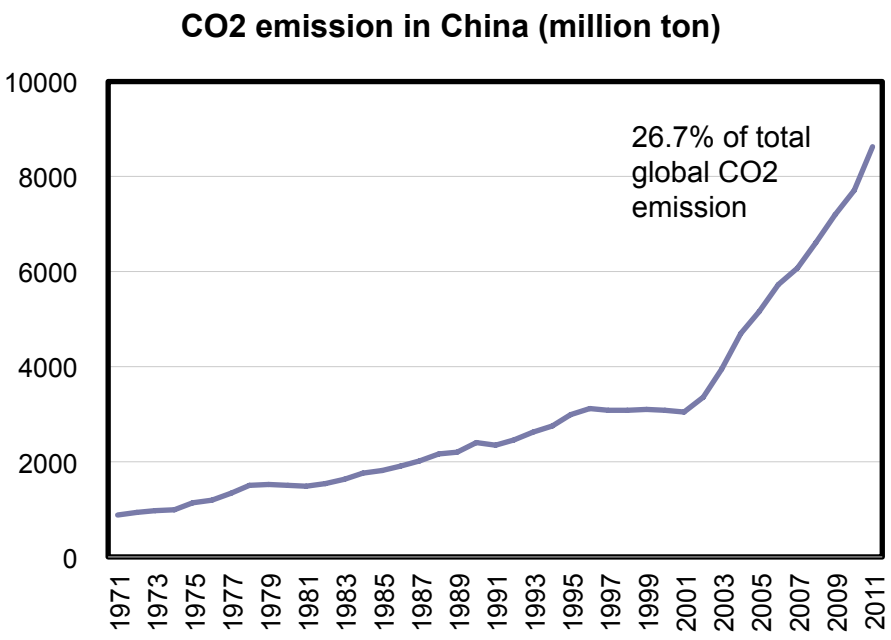
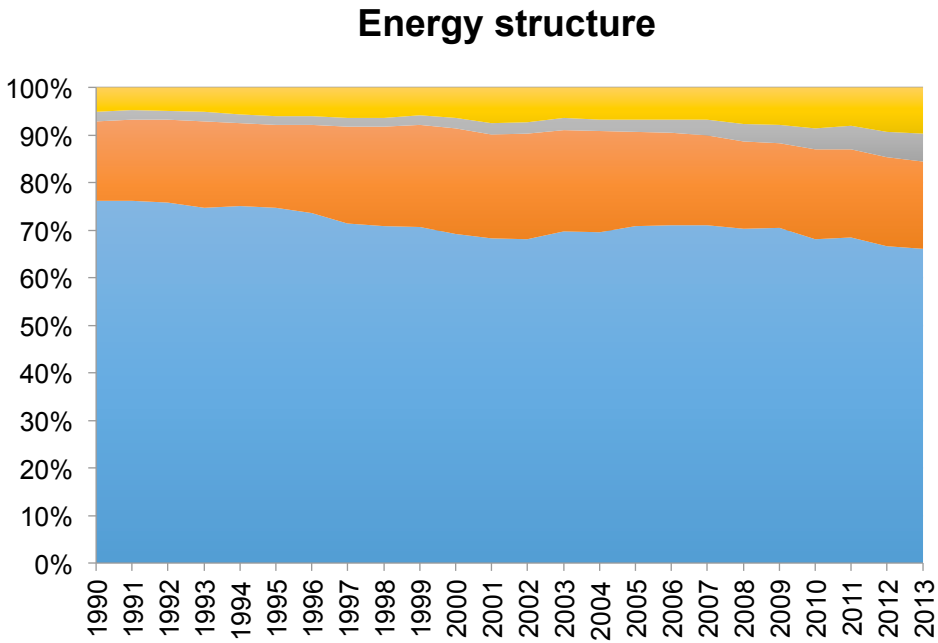
Low carbon development——
pressure from international community

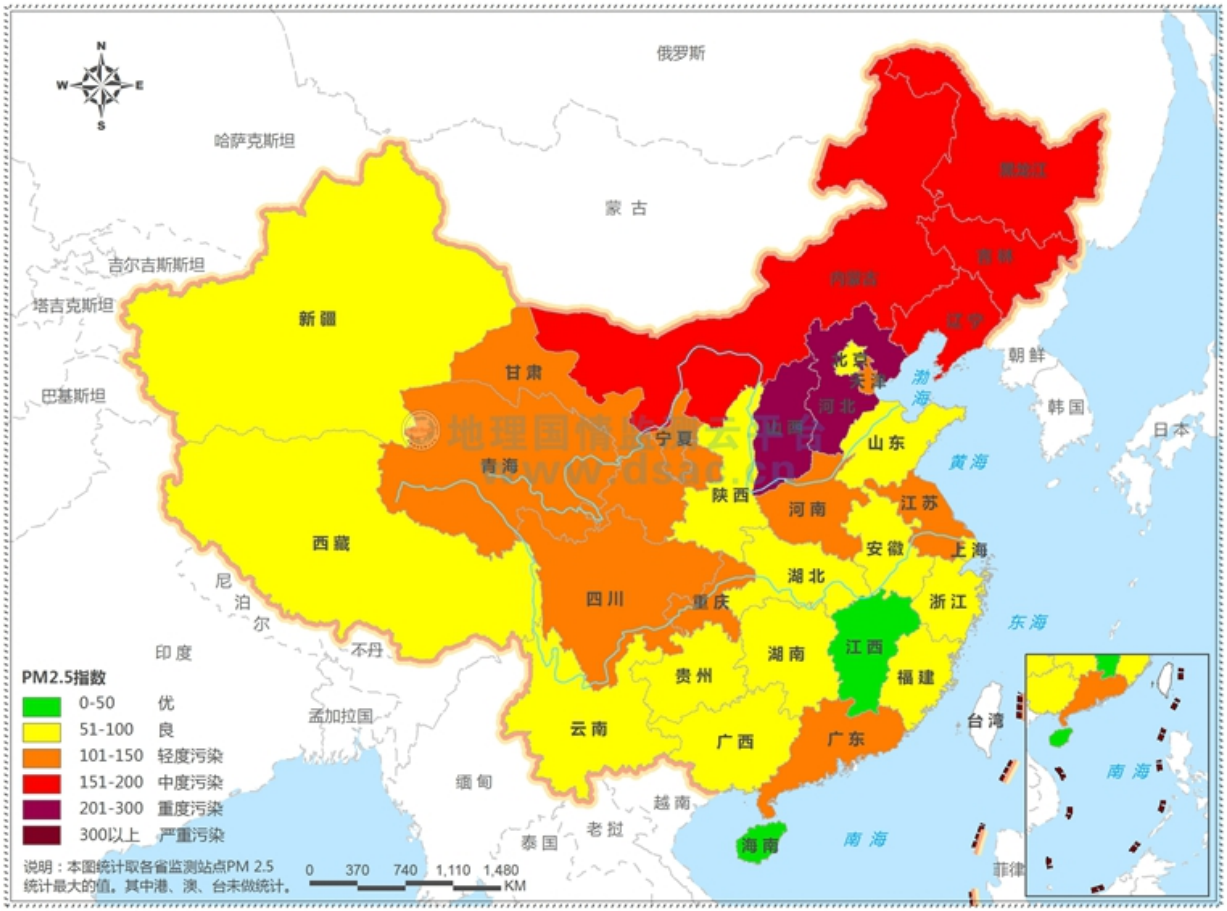




Data source: IEA & China Statistic Yearbook 2014

- China is the biggest CO2 emitter of the world.
- Coal dominated energy system results in higher CO2 emission.

Low carbon development—— domestic demanding



Water resources

Land resources

Ecological

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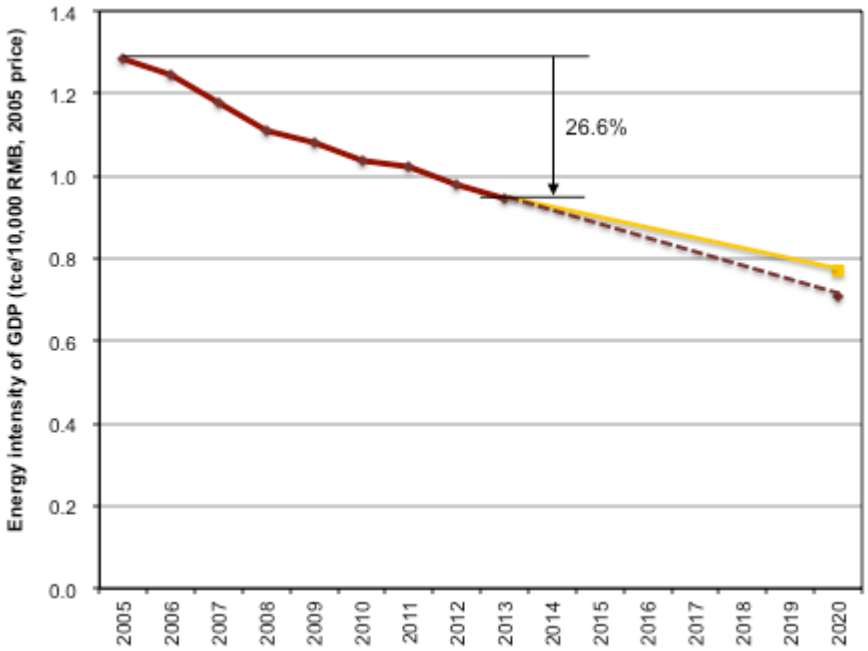
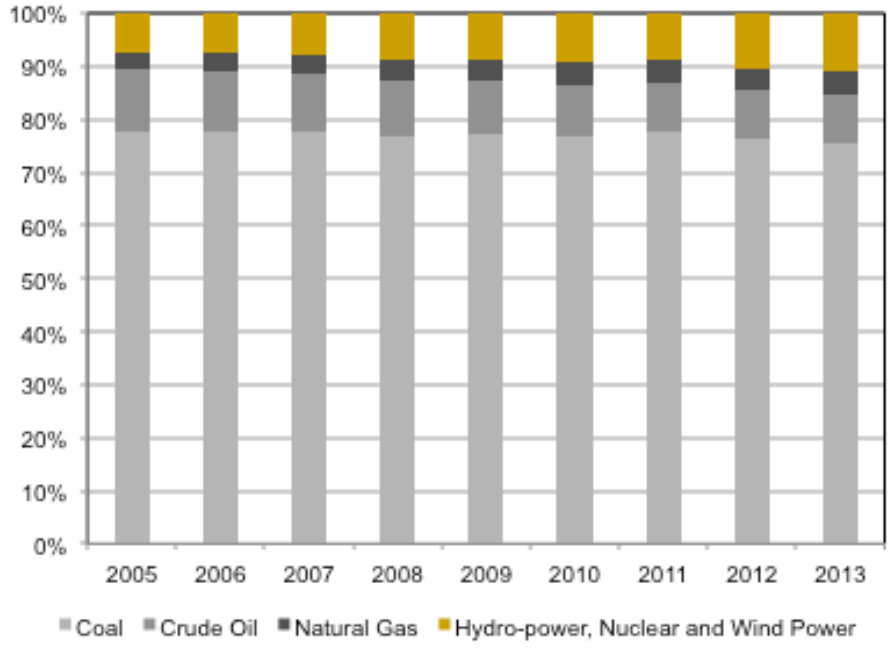
Air pollution!

PM2.5 concentration of 28th Nov, 2014

Overall targets of China's addressing climate change

- China pledged in 2009 to reduce CO_2 emissions per unit of GDP by 40-45% on 2005 levels by 2020 and a share of non-fossil energy of 15%.
- China announced in November 2014 that it would peak CO_2 emissions by 2030, and increase the share of non-fossil energy carriers of the total primary energy supply to at least 20% by then.





Coal consumption control

Targets by 2020:

- The share of coal in primary energy < 62%
- More than 60% of coal used for electricity generation

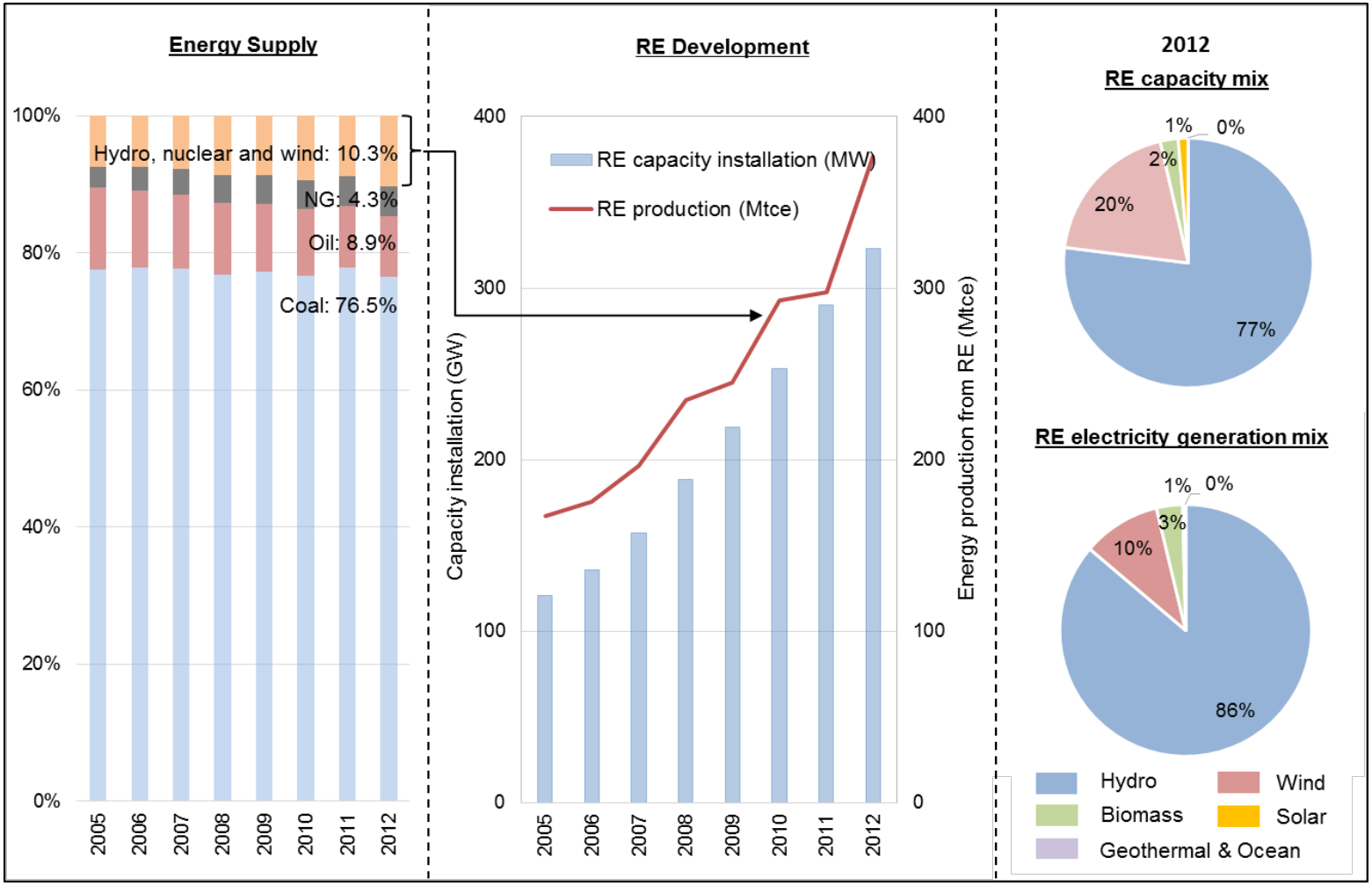
New entries

- Scale: 600 or 1000 MW ultra supercritical coal combustion technologies
- Efficiency: coal consumption < 300 gce/kWh
- Emission: smoke, SO_2, NO_X emission concentration less than 10, 35, 50 μg/m3 in eastern provinces

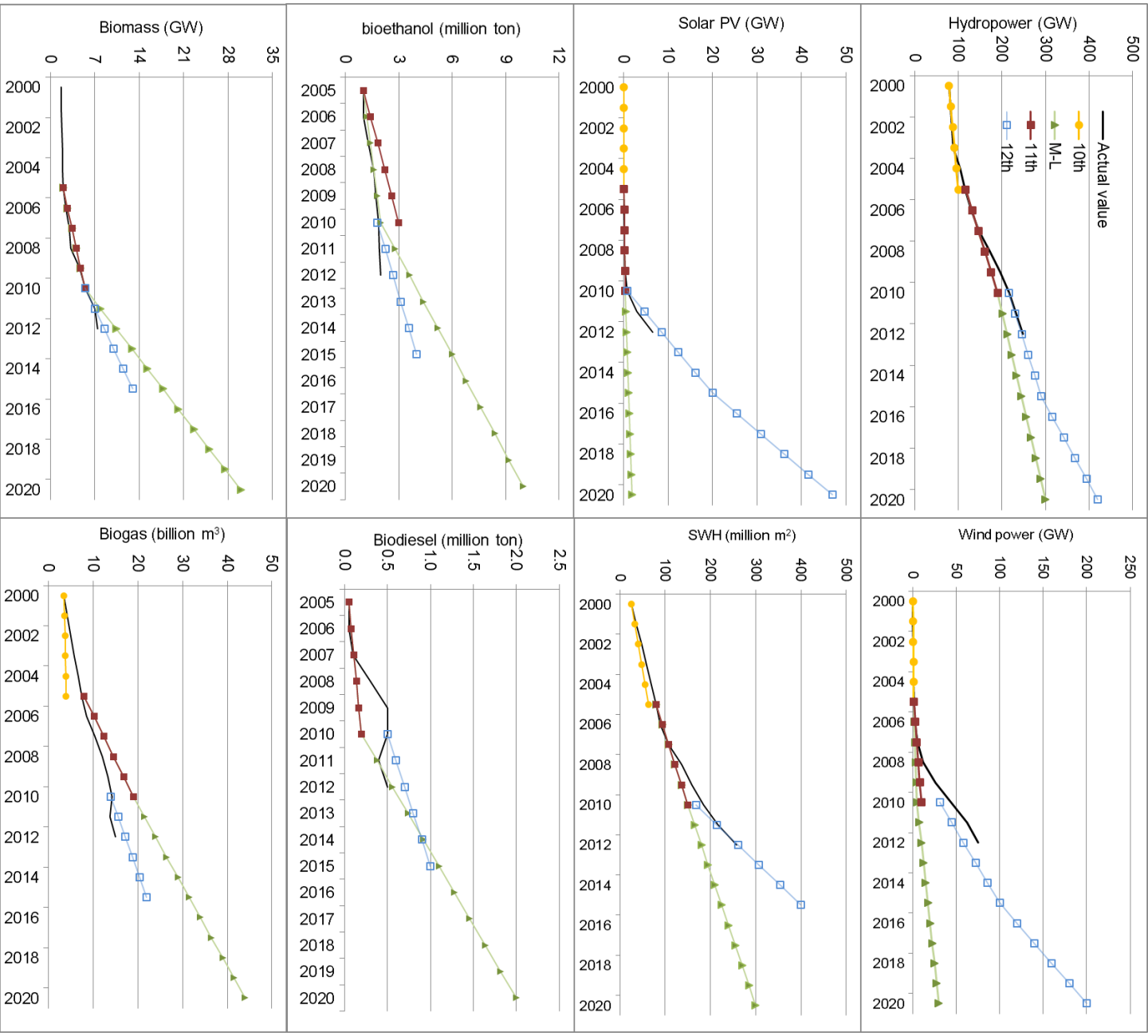
Current plants

- Closedown backward efficiency turbines (< 50 MW)
- Closedown turbines whose pollutants emission can't meet environmental standards
- Phase out 100 GW of backward efficient turbines by 2020

Energy structure optimizing

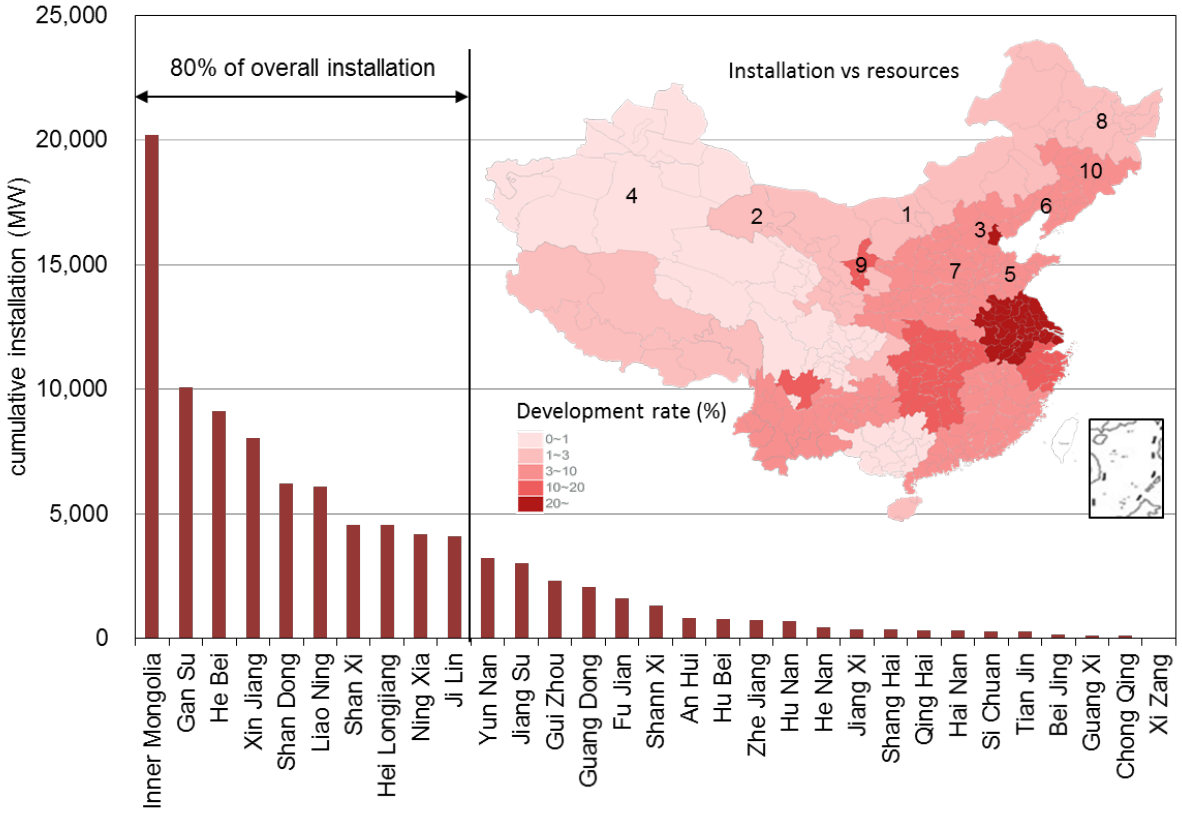


Comparisons of Central Government Targets and the Actual Capacity Growth of RE



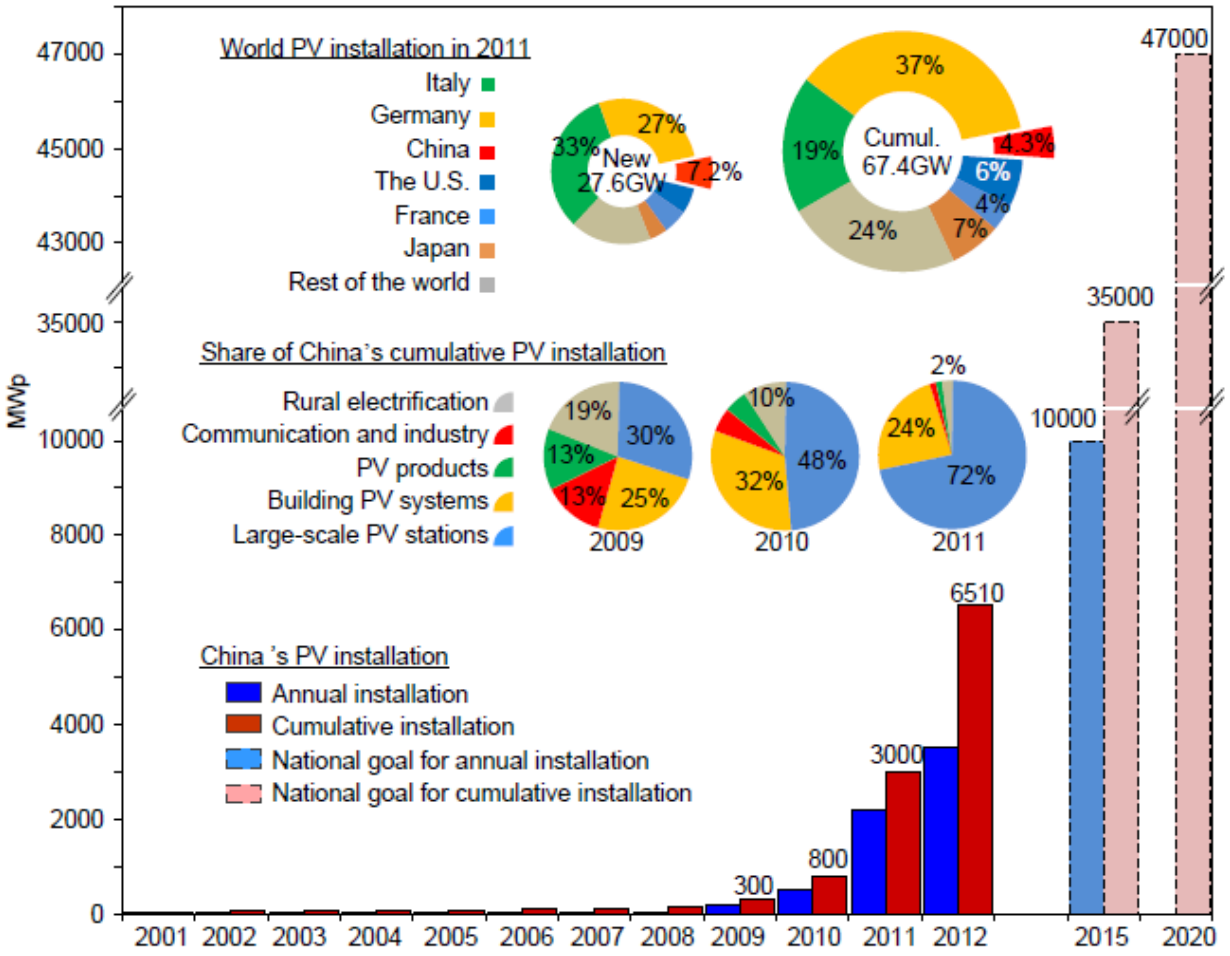
Development of wind power in China

- Installed wind turbines are generally located in provinces with abundant wind resources, such as Inner Mongolia, He Bei, Gan Su, and northeast China.
- 14 provinces have cumulative installed capacity of over 1 GW, and the 10 provinces with the greatest installed capacity account for approximately 80% of China's total installation capacity.

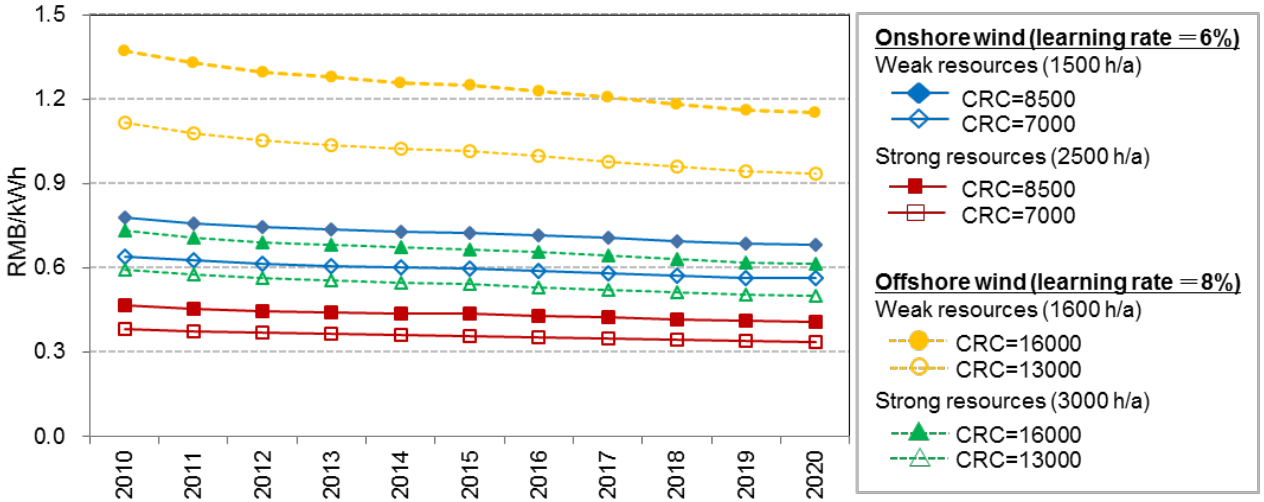


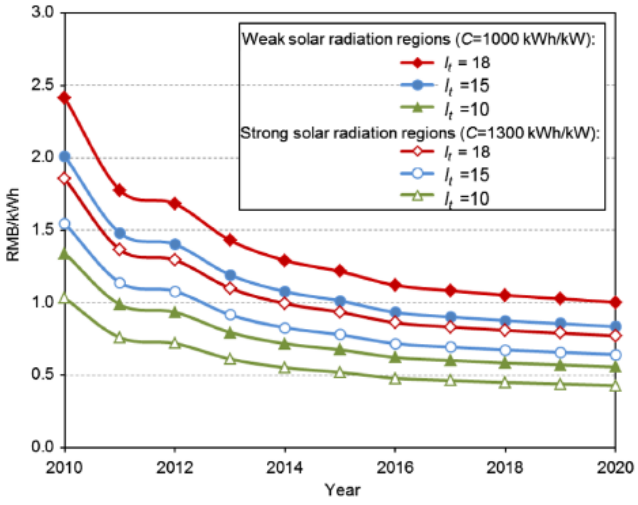
Solar PV development in China

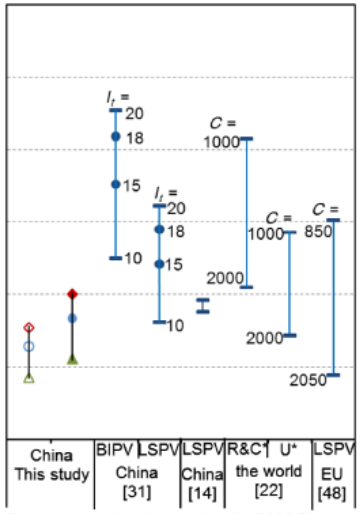
- Solar PV installed more capacity than any other renewable technology.
- Total capacity reached 139 GW in the world.
- China solar PV capacity added 10 GW in 2014, and bring total capacity to 26.5 GW.



Cost decrease of wind power and PV



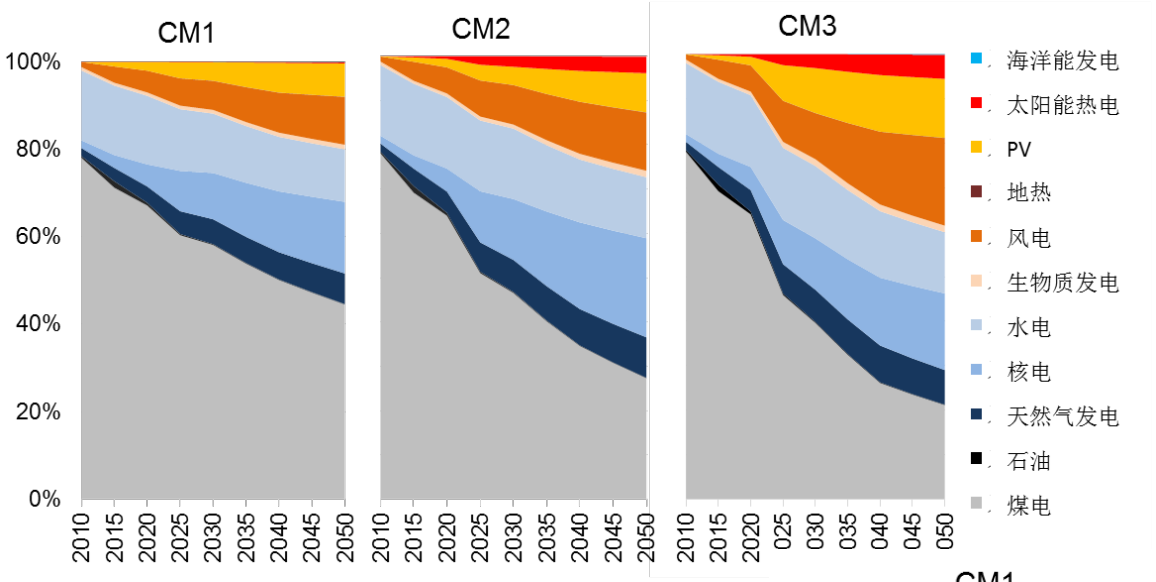




Comparison with other studies for 2020 PV cost

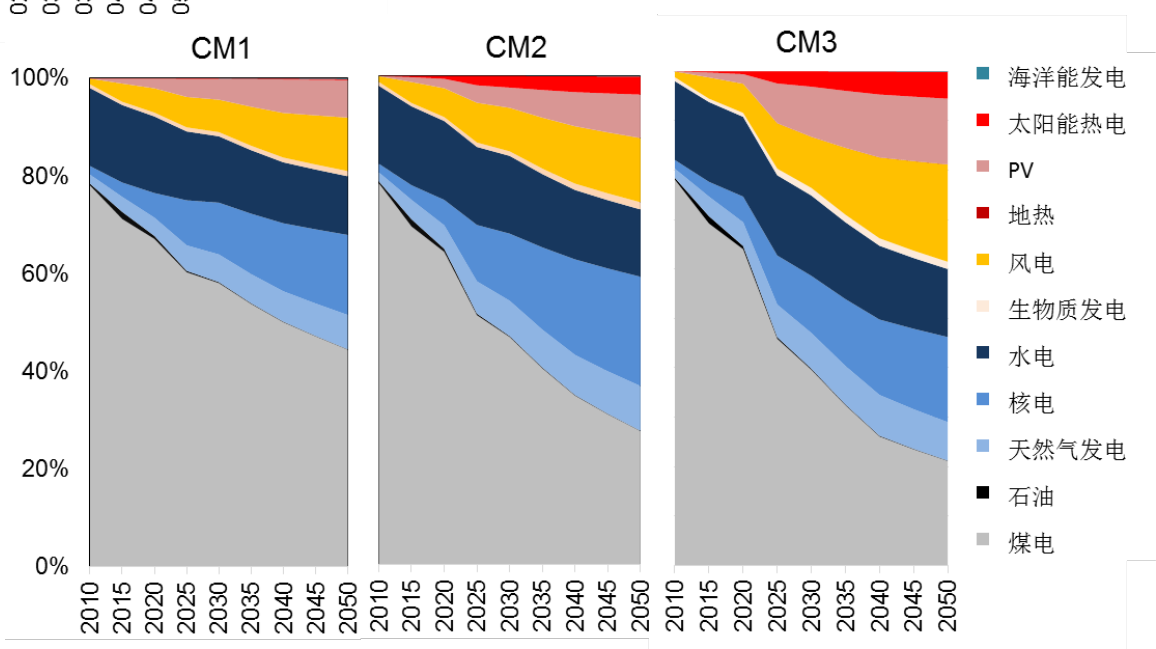
*Notes:
1. I_t: Initial investment expenditures (10^3 RMB/kW); C: kWh/kW
2. R&C: residential & commercial; U: utility
3. Currencies in different studies are normalized to RMB, 1 USD=6.8RMB, 1 Euro=8.9RMB

Low carbon development roadmap of power sector

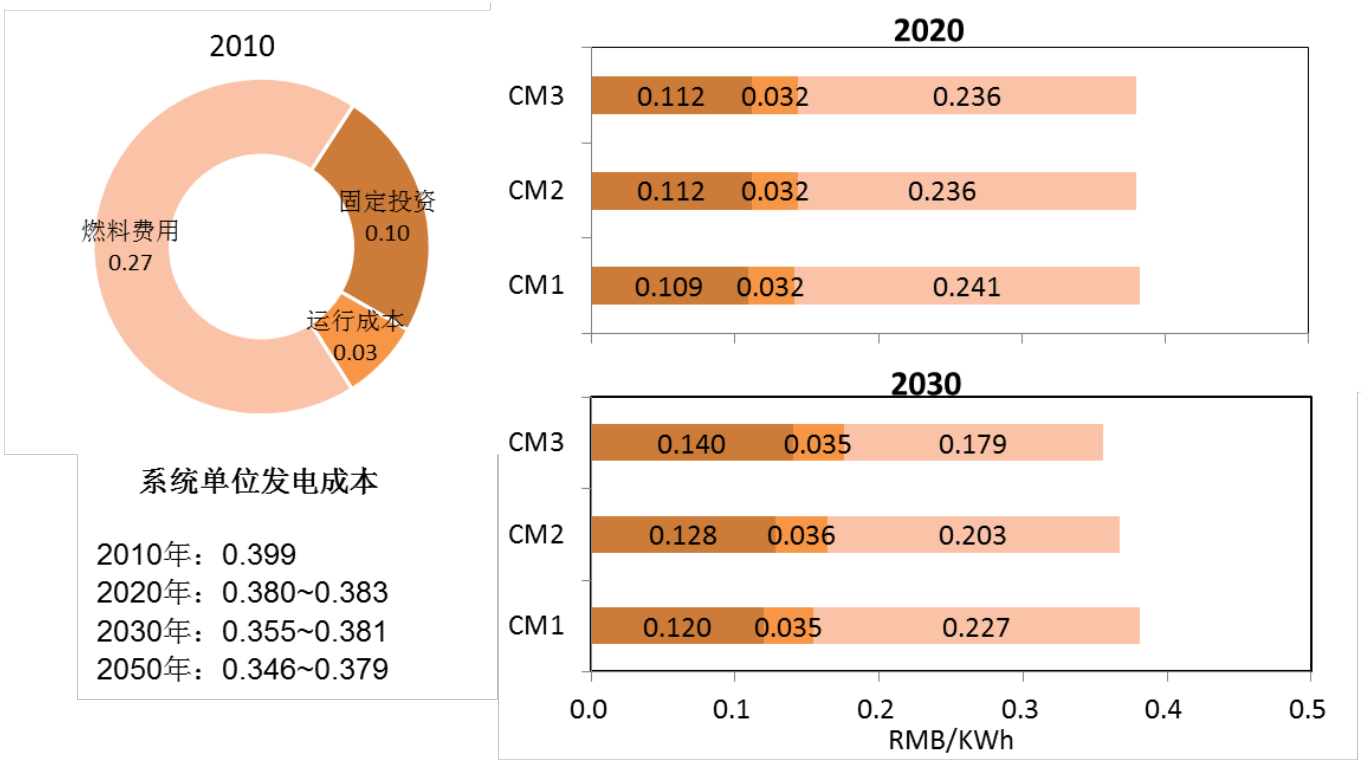


Installation mixture

Electricity generation mixture



Co-benefits of energy structure optimization



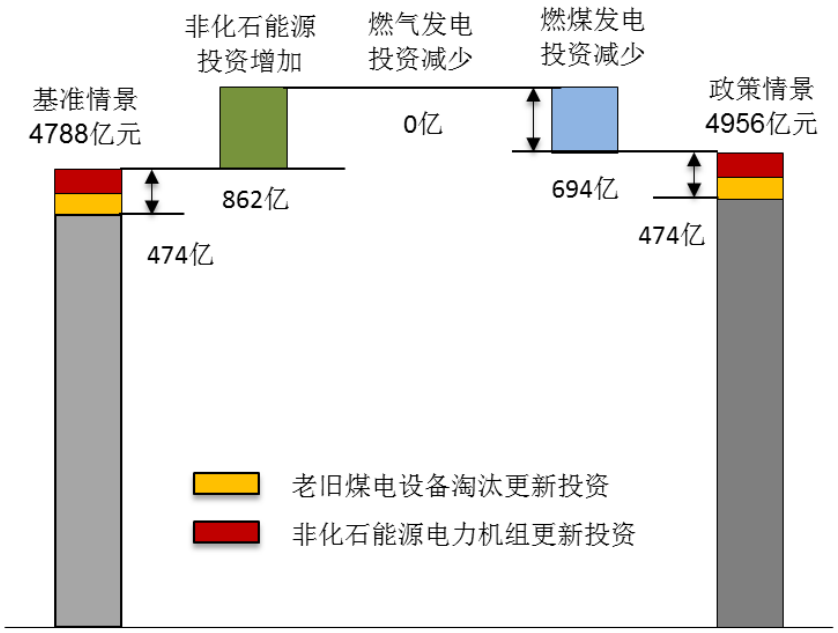
- Cost of electricity system
  - Decrease by 4.0%~4.8% in 2020
  - Decrease by 5.0%~13.3% in 2030
- Low carbon electricity develop in large scale could save more than 20 billion investment in electricity system, if the electricity supply is 9900TWh by 2030

Capital cost analysis on power sector

BAU scenario: 478.8 billion RMB (including capital investment to update fossil and non-fossil installations: 47.4 billion RMB)

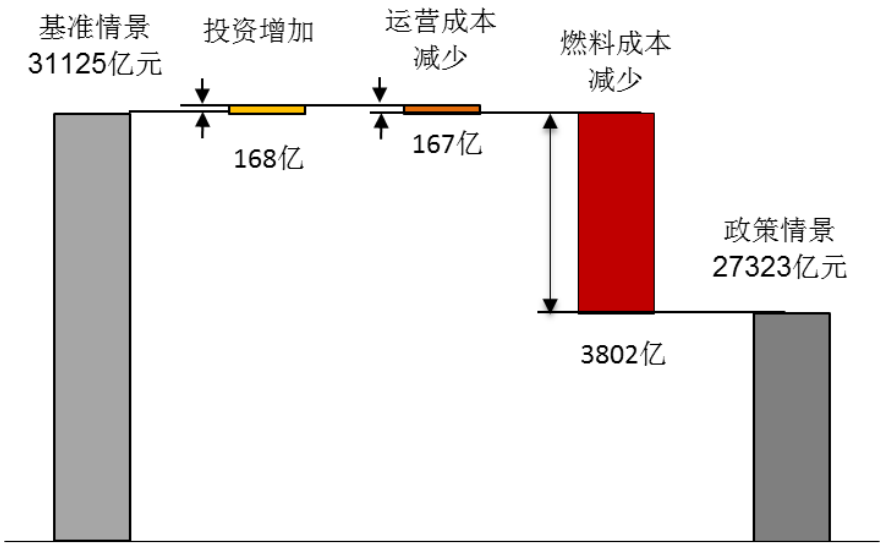
+ non-fossil installation investment: 86.2 billion RMB
– coal-fired power plant investment: 69.4 billion RMB

Policy scenario: 495.6 billion RMB



Capital cost of grid construction and energy storage were not taken into accounted.

System cost analysis on power sector



BAU scenario: 3112.5 billion RMB

\+ capital cost: 16.8 billion RMB

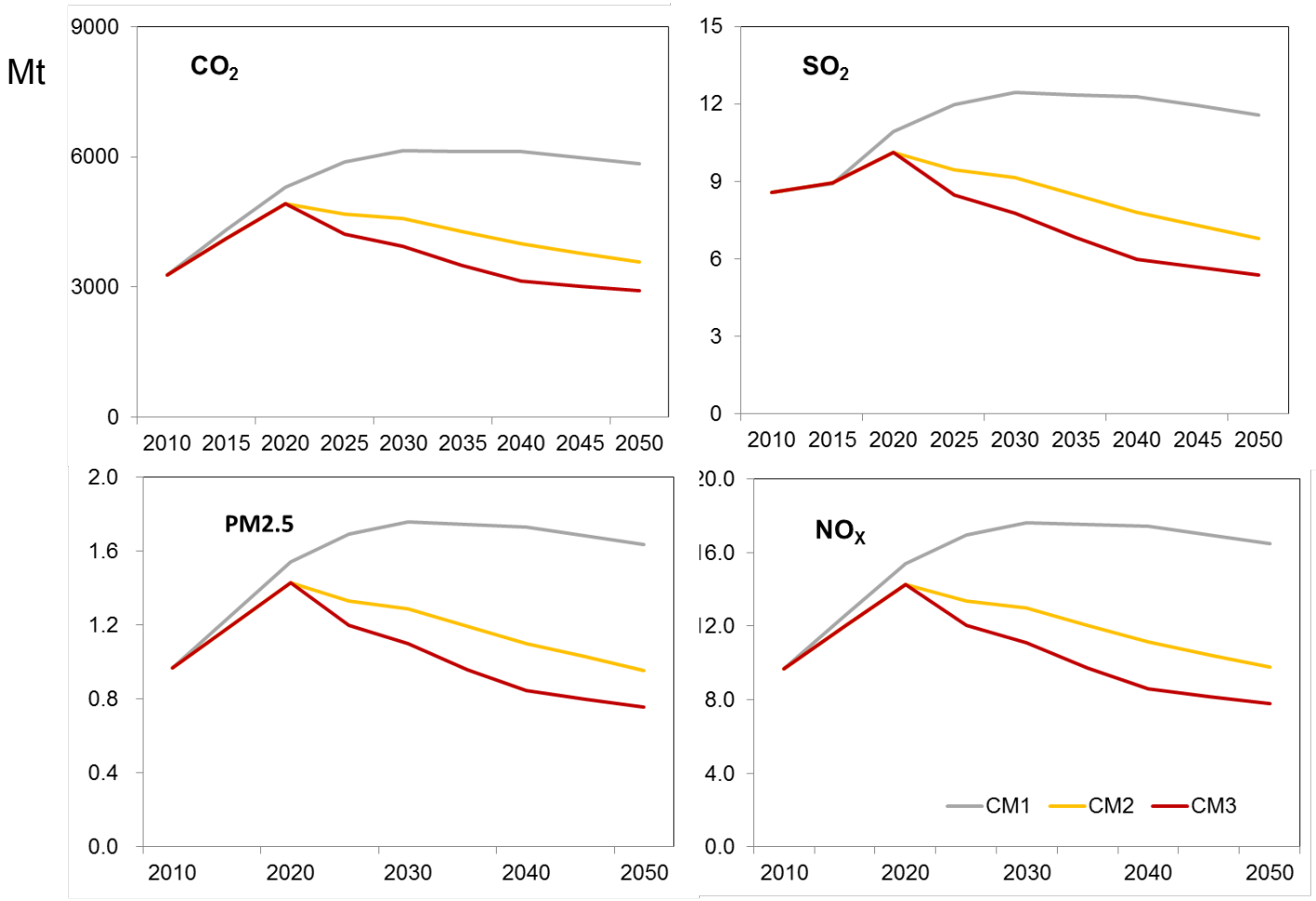
– O&M cost: 16.7 billion RMB

– fuel cost: 380.2 billion RMB

Policy scenario: 2732.3 billion RMB

- Energy system turns to a high investment cost and low marginal cost restructuring
- The impact of fossil fuel price fluctuations on the energy system could be reduced largely.
- The power sector turns to more secure, green and efficient.

Co-benefits of energy structure optimization



- Low carbon electricity technologies could result in CO_2, SO_2, PM2.5, and NO_x mitigation.
- In policy scenario, the emission of CO_2, SO_2, PM2.5, and NO_x in 2050 could fall back to the level of 2010, which means 39~54% lower than the level of BAU.

Thank you for your attention!

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